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THE ICHNEUMON FLIES OF AMERICA BELONG-
ING TO THE TRIBE OPHIONINI.

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INTRODUCTION.

This paper forms the major part of a thesis for the degree of doctor of philosophy at the Massachusetts Agricultural College, where it has been prepared under the supervision of Prof. Charles H. and Dr. Henry T. Fernald. To both, for the many ways in which they have guided and encouraged me in the work, I give my sincere thanks.

The investigations contained in this paper are based upon the extensive collections of the United States National Museum and the American Entomological Society in Philadelphia. In addition to these the collections of the New York State Museum, the American Museum of Natural History, the Boston Society of Natural History, the Brooklyn Museum, the Leland Stanford, Jr. University; the New Hampshire, Minnesota, Montana and Colorado State Agricultural Colleges; the North Carolina Department of Agriculture, the Pennsylvania Department of Agriculture, Division of Zoology, the Boll Weevil Laboratory of the Bureau of Entomology, U. S. Department of Agriculture, at Dallas, Texas, and other smaller collections have been carefully examined. All but four of the types existing in America, so far as known, have been examined and descriptions prepared di-

rectly from them, modified or added to by comparing with other specimens and the original descriptions. During the time that I have carried on this work material has been loaned, through Dr. H. T. Fernald, and assistance given by many persons. I am greatly indebted to Dr. L. O. Howard of the U. S. Department of Agriculture and Dr. Henry Skinner of the American Entomological Society for the loan of material; to Messrs. J. C. Crawford and E. T. Cresson, Jr., for aid at the museums with which they are connected; to the Committee of Nomenclature of the Entomological Society of America, for rulings on numerous problems; to Mrs. A. K. Dimmock, for information as to the habits of *Thyreodon morio*, with specimens of its cocoons and of *Encyrtus thyreodontis*, its parasite; to Messrs. C. W. Johnson, E. D. Sanderson, William Beutenmüller, W. D. Hunter and others for the loan of material; to Messrs. C. O. Waterhouse, Geoffrey Meade-Waldo and A. G. B. Bouquet for information in regard to types in the British Museum; and to Mr. W. T. Horne with regard to types in Havana, Cuba.

This division of the subfamily was first proposed by Förster in 1868 as the Family Ophionoidæ and first given tribal rank by Ashmead in 1894. Most of the work on this group has been done on European species by Brullé, Gravenhorst, Förster, Vollenhoven, Thomson, Taschenberg and Szepligeti, but Brullé, Taschenberg and Szepligeti have also described many American species. Among American workers, Cresson, Norton and Ashmead have described numerous species, but none of these have treated the tribe as a whole. Felt's paper is the best for the North American species, but only covers the more common species of *Ophion*, *Eremotylus* and *Enicospilus*. The largest American collections in this tribe are probably at the United States National Museum and the American Entomological Society in Philadelphia, but the Massachusetts Agricultural College has a good representation, and the British Museum has considerable unworked material. The largest number of types was found in the collection of the American Entomological Society.

Some European writers have added much confusion to our knowledge of this tribe by describing numerous new species from America without a proper knowledge of those already described. Many of these descriptions are too brief to make identification possible, and others are clearly synonyms.

Mr. H. M. Russell began work on this tribe, and in 1906 offered a senior thesis on the genera *Agathophiona*, *Enicospilus*, *Eremotylus*, *Ophion*, *Ophiopterus* and *Thyreodon* as represented north of the Isthmus of Panama. Upon his acceptance of a position with the Bureau of Entomology at Washington, his material was placed in my hands, and the bibliographies he had prepared and some other portions proved very useful. As he had studied almost none of the types, however, and had not completed studies on any of the species, it became necessary to repeat all he had done, and therefore I must assume responsibility for any errors or deficiencies discovered in this paper.

TABLE OF TRIBES.*

1. Second recurrent nervure joining the cubitus *behind* the transverse cubitus, or interstitial with it; middle tibiæ always with *two* apical spurs.....Other (Non-American) Tribes.
 Second recurrent nervure joining the cubitus *before* the transverse cubitus, or it is entirely wanting (*Pharsalia* Cr.); if it joins the cubitus *behind* the transverse cubitus then the middle tibiæ have but a *single* apical spur.....2.
2. Middle tibiæ with *two* apical spurs; second recurrent nervure joining the cubitus *before* the transverse median nervure.....3.
 Middle tibiæ with only one apical spur; second recurrent nervure joining the cubitus *behind* the transverse cubitus or entirely wantingTribe NOTOTRACHINI.
3. Antennæ *short, clavate*; mesosternum beneath flat, mesonotum without parapsidal furrows.
 (Non-American) Tribe HELLWIGHINI.
 Antennæ *long, subsetaceous* (filiform); mesonotum usually with distinct parapsidal furrows.....Tribe OPHIONINI.

* It has not seemed necessary to include tables from the Family Ichneumonidæ since any one using this paper will undoubtedly be able to recognize Ophionini, but such if desired can be found in Proc. U. S. Nat. Mus., No. 1206, pp. 10, 85 (Vol. 23, 1901), 1900. The table of tribes given here is that of Ashmead, slightly rearranged and modified.

Tribe OPHIONINI Först.

- Ophionoidæ *Förster*, Verh. Nat. Ver. Pr. Rheinl., 25, pp. 141, 149; Fam. 7.....1868.
 ? Ophioninæ *Cameron*, Biol. Centr. Amer., Hym., I, pp. 2881886.
 Ophionidæ *Thomson*, Opusc. Ent., XI, p. 1047, Fam.....1887.
 Ophioninæ *Cresson*, Syn. Hym. N. A., p. 43, Subfam.....1887.
 Ophionini *Ashmead*, Proc. Ent. Soc. Wash., III, p. 277, Tribe VII.....1894.
 “ *Davis*, Trans. Amer. Ent. Soc., XXIV, p. 195, Tribe1897.
 “ *Ashmead*, Trans. Ent. Soc. Lond., p. 354, Tribe II.....1900.
 “ “ Smith’s Ins. N. J., p. 580, Tribe II.....1900.
 “ “ Proc. U. S. Nat. Mus., No. 1206, pp. 84, 86, Tribe II (Vol. 23). Classification of Ichneumon Flies.....1900.
 “ “ Faun. Hawaiensis, Vol. I, part III, p. 341, Tribe II.....1901.
 Ophioninæ *Dalla Torre*, Cat. Hym., III, p. 179, Subfam., XI.....1901.
 Ophionini *Felt*, N. Y. State Mus., Bull. 76 (19th Ent. Rept.), pp. 79–1251903.
 Ophioninæ *Szepligeti*, Gen. Ins., Hym. 34^{me} Fas., pp. 2, 20, Subfam. V1905.
 Ophionini *Schmiedeknecht*, Opusc. Ichn., XVIII, p. 1416, Tribe II.....1908.

Median tibiæ with two apical spurs, wings without areolet, discocubital cell receiving both recurrent nervures, antennæ long, filiform.

Type of tribe.—*Ophion* Fabr.

To this tribe belong the true Ophions—insects belonging to the Genus *Ophion* and its allies, which may be distinguished from all the others in the subfamily, except the Hellwigiini, by their venation, the discocubital cell receiving *both* recurrent veins. The Ophionini are however readily separated from the Hellwigiini by the long filiform antennæ, short and clavate in the latter, and as the Hellwigiini are so far as known entirely European there need be no confusion. These characters, with the usually strongly compressed and falcate abdomen, readily separate the members of this tribe. This division of the subfamily was first proposed by Förster in 1868 as the Family Ophioninæ, and first given tribal rank by Ashmead in 1894, since which time it has been generally recognized.

DISTRIBUTION.

The Tribe Ophionini comprises about thirty genera of which only eight have been found in America. Of these *Ophion*, *Enicospilus* and *Eremotylus* have a world-wide distribution, but among the others, most of the species are American; members of the tribe range in America from Sitka, Alaska, to Chubut Territory (Patagonia), Argentina, including the West Indies. Most of the species are tropical or subtropical, but some range into the Boreal Zone; *Ophion bilineatus* apparently ranges from Alaska to Patagonia, *Enicospilus purgatus* from Alaska to Chili, and *Thyreodon laticinctus* from Central Mexico to Chili.

TABLE OF GENERA.

1. Discocubital vein *angularly broken* and appendiculate.....2.
 Discocubital vein *not angularly broken*, straight or bent.....3.
2. Labium abnormally *lengthened*, nervellus broken slightly above the middle, nervulus postfurcal to interstitial.
 Agathophiona West.
 Labium *normal*, not lengthened, nervellus broken at or below the middle, nervulus antefurcal to interstitial....**Ophion** Fabr.
3. Claws *simple*, not pectinate.....**Retanisia** Cam.
 Claws *pectinate*4.
4. Discocubital cell *with* one or more maculæ...**Enicospilus** Steph.
 Discocubital cell *without* maculæ.....5.
5. Nervellus *straight*, not broken.....**Ophiopterus** Br.
 Nervellus *angularly broken*.....6.
6. Nervellus broken *above* the middle7.
 Nervellus broken *at* or *below* the middle.....9.
7. Ocelli *large*, close to each other and to the tops of the eyes.
 Athyreodon Ashm.
 Ocelli *small*, well separated from each other, and from the tops of the eyes.....8.
8. Anterior wing *with* stigma.....**Ophion** Fabr.
 Anterior wing *without* stigma**Thyreodon** Br.
9. Radial vein with the basal half *slender*, not thickened.
 Ophion Fabr.
 Radial vein with basal half *thickened*.....10.
10. Base of radial vein straight.....**Ophiomorpha** Szep.
 Base of radial vein bent.....**Eremotylus** Först.

EXTERNAL ANATOMY.

Head (Pl. I, fig. 4).—The hypognathous head is large, viewed from in front usually as broad or slightly broader than high, rarely higher than broad; when viewed from above oblique in outline and somewhat hollowed out behind. The compound eyes are usually large, extending almost to the base of the mandibles; rarely small, distant from the base of the mandibles and more narrow; the anterior margin is usually emarginate opposite the antennal fossæ, but is sometimes only slightly so, being almost straight. Each eye is sometimes surrounded by a more or less distinct crenulated carina.

The three usually prominent ocelli are located on the vertex between the tops of the eyes, in the form of a triangle, which varies somewhat in shape and size. The size and distance of the ocelli from the tops of the eyes vary in different genera—and somewhat in different species—the latter from twice the diameter of the ocellus in *Thyreodon*, to little or practically nothing in *Athyreodon*, with the other genera intermediate but nearer *Athyreodon*. A few species of *Ophion* have, however, small ocelli and some species of *Thyreodon*, especially *Thyreodon spectabilis*, indicate that the size is not well fixed. I have seen specimens of this species which apparently bridge the distance between the large and small ocelli of *Athyreodon* and *Thyreodon*.

The vertex is not distinctly separated from the occiput, except in *Ophion costale*, where a distinct carina runs from the tops of the eyes to the posterior ocelli, though similar but indistinct carinæ sometimes occur in other members of the tribe.

The vertex is usually smooth, sometimes rugose, and often with a median carina running from the anterior ocellus to or below the antennal fossæ; these, located slightly above the middle of and not far from the eyes, vary somewhat in size and depth and are sometimes inclosed by a distinct carina. The long filiform antennæ are divided into a scape, pedicel and flagellum of about 61 segments, the number varying somewhat. The frons, which is continuous with the vertex, extends to or below the base of the eyes. It usually

bears no distinctive marks, but more or less evident tubercles are sometimes present below or between the antennal fossæ. The clypeus is not separated from the frons above but at its outer margin is a more or less distinct fovea, deep and oval or sometimes shallow and more elongate, with a furrow extending from it to the base of the mandibles; the anterior margin of the clypeus is rounded, or somewhat pointed in the middle. The mouth parts vary but little in this group so far as I have seen, and are not of value in determining species; the only difference is a slight variation in size in different species. The mandibles are long, slightly curved, bidentate and tipped with, or in some cases entirely, black; one of the teeth being somewhat longer.

Behind, the head is somewhat hollowed out.

The *thorax* is smooth or more or less distinctly punctate and the thoracic sutures are often keeled or crenulate, especially between the pleuræ.

Prothorax (Pl. I, figs. 1, 3).—The prothorax is divided into two parts: the slender collar which articulates above with the head, and bears the anterior legs below, and behind this on each side a triangular shaped piece extending back to the insertion of the anterior wings. The collar fits into a sort of socket in the front of the second part and mesothorax and is hardly visible from the side. Beneath, a weak median groove runs from the articulation with the head to between the insertion of the coxæ, dividing the collar into lateral lobes.

Mesothorax.—The mesonotum is a broad plate lying between the anterior wings, prothorax and the metathorax with its edge frequently carinate. It is somewhat convex, usually with more or less distinct parapsidal furrows running from the anterior border to and converging on the posterior border. They are sometimes distinct only in front, sometimes broad and crenulated or with one or more carinæ, and sometimes join at or before the posterior border.

Behind the mesonotum but separated from it by a deep, more or less distinct furrow lies the scutellum. Its center is convex and circular or somewhat elongate, with more or

less distinct lateral carinæ which usually connect it with the mesonotum in front and sometimes unite behind. In some species these carinæ are high and the front of the scutellum appears deeply excavated, in others they are indistinct.

The broad mesothoracic pleura lies below the anterior wing, its posterior edge being frequently crenulate or keeled, the suture running obliquely from the base of the anterior wing to the posterior edge of the mesocoxa, where a small projection articulates with a similar one from the metapleura and apparently serves to prevent too great flexure of this segment of the leg. There are no sutures or other marks between the pleura and sternum, and I have observed no characters on the latter which are useful in distinguishing species.

Metathorax.—The metathorax proper is a narrow band which lies directly behind the mesothorax, bearing the posterior wings above and the posterior legs below. It has no distinctive characters and is so closely joined to the median segment—which I have everywhere referred to as the metathorax—that I have not mentioned it in descriptions. It consists of a narrow dorsal band, composed of the pleura and postscutellum, partly separated by the insertion of the posterior wings, and a narrow ventral section—epimeron—extending back below and closely attached to the median segment and bearing the posterior legs behind.

Median segment.—The median segment, or, as I have everywhere called it, the metathorax,* is rounded, sometimes with the back part of the metathorax proper almost globular, but generally more or less flattened behind and sloping to the insertion of the abdomen. In the Genus *Ophiopterus*, however, it is produced behind into a distinct neck. The surface is smooth, more or less strongly, finely or coarsely rugose, rugose-striate or reticulate or rarely almost granulose. A more or less distinct median longitudinal furrow frequently runs from the insertion of the abdomen to the posterior edge of the metathorax proper, but in some species this is wanting.

* In all descriptions of American species of this tribe, it has been referred to as the metathorax and a change would lead to confusion.

Wings (Pl. II, fig. 8).—The wings are quite large, usually hyaline and often iridescent, though frequently, especially in *Thyreodon* and *Athyreodon*, more or less colored with fuscus, fulvus or fuliginous, sometimes with a violet reflection, and in some species entirely black or cyaneous. The surface is sparsely covered with very fine, short hairs, but a glabrous area frequently occurs in the discocubital cell. It has seemed best to follow in this paper the nomenclature of veins and cells used by Cresson and others, and this is given on Plate II, figure 8.

Anterior wing.—A well developed stigma is present in most members of this tribe, but in *Thyreodon* and *Athyreodon* it is lacking. The discocubital cell receives both recurrent veins—which vary in length in different species—and in the Genus *Enicospilus* contains one to three yellow chitinous thickenings called maculæ. The number, size and shape of these maculæ seem constant in some species but in others variation is evident. The discocubital vein is angularly broken, angularly bent or arcuate, sometimes slightly sinuous, and this difference in shape has been given generic value. In *Agathophiona*, and *Ophion* it is usually angularly broken and appendiculate with a short stub of a vein—appendix—extending from the point of the angular out into the discocubital cell—but in some species only angularly bent or arcuate and without an appendix. In the other genera it is arcuate or slightly sinuous. The radial vein is slender throughout and straight, except in the Genera *Eremotylus* *Enicospilus* and *Ophiomorpha* where it is thickened and more or less bent, or in some species angularly broken near the stigma. This is, I believe, the older condition showing where the second transverse cubital vein originated. The place of connection of the transverse median vein, or, as I have called it for brevity, *nervulus* (thereby following European writers), and the median vein, varies in different species; in some it meets the end of the basal vein—when it is called *interstitial*—or is nearer the body—*prefurcal* or *antefurcal*, in these cases uniting with the discoidal vein (which is Cresson's name for

the median beyond its union with the basal vein). In others it is *interstitial*, or nearer the apex of the wing—*postfurcal*. Transparent spots, called bullas, occur in the discocubital and second recurrent veins. The discoidal and cubital cells are confluent, and as there is no areolet this portion becomes a sort of appendix. The third discoidal cell is in most Ophions short and thick, but in *O. costale*, as in the other genera, it is long and narrow.

Posterior wing.—The only important character in the posterior wing is the shape of the transverse median vein, or, as I have called it—following the European writers—the *nervellus*. This is broken in most genera, but in *Ophiopterus* it is straight. In *Thyreodon* and *Athyreodon* it is broken well above its middle, and in *Ophion* it is usually broken below the middle, but in a few species at or above this point.

The frenal hooks are borne on the anterior margin in two places, along the base of the radial cell and frequently near the base of the median cell. The number varies considerably in a species and often on the two sides of an individual.

Tegulæ.—The tegula is a small chitinous plate lying over the base of and separating the anterior wing from the side of the mesonotum and propleura in front and the mesonotum above. Its surface is smooth or sparsely pubescent. In *Ophiomorpha* the tegulæ are rudimentary or wanting.

Legs.—The legs are long and rather slender, the anterior being shortest and the posterior longest. The coxæ and trochanters are unarmed, but are with the rest of the legs more or less sericeous or pubescent. The coxæ are large and closely articulated with the body, the posterior being usually larger. The shape is conical or subconical, with the insertion of the trochanter dorso-apical. The unarmed femora vary from each other only in size. The anterior tibia is the only one which is shorter than its femur, and bears at its apex, below, an articulated tibial comb. This, in connection with a similar comb on the base of the first tarsal segment, forms a cleaning apparatus often seen in Hymenoptera. Each of the median and posterior tibiæ have two apical spurs, of which the inner is noticeably longer.

The five tarsal joints vary only in length, the first being nearly as long as the other four, the others, except possibly the last, gradually decreasing in length beyond the first. At the apex of the last tarsal segment is a pair of well developed curved claws between which is a large pulvillus. On the inner side of the claw between its base and apex are, except in *Retanisia*, several teeth (pectinate). In *Ophion* these are rather fine, while in *Thyreodon* and *Athyreodon* they are coarse. Aside from size, and the presence of two tibial spurs instead of a cleaning apparatus, the posterior legs differ but little from the others.

Abdomen (Pl. I, figs. 2, 5).—The first true abdominal segment is the median segment, propodeum or, as I have called it following other writers, the metathorax; this has already been described under the thorax. Aside from this the abdomen consists of seven visible segments, with a possibility that in the male the seventh is really the seventh and eighth fused. It is long, falcate and usually strongly compressed laterally except in *Ophion bitoveolatus* and the Genus *Retanisia*. The first two segments are usually somewhat cylindrical, and slightly enlarged at the distal ends; beyond this the abdomen is enlarged more or less acutely, depending on the genus and species. In *Ophiopterus* it is narrow throughout while in most of the other genera it is enlarged beyond the second segment. At the apex are the two short, clavate cerci often seen in other Hymenoptera. In the female the apex of the abdomen is abruptly truncate and from its lower edge projects the ovipositor, with its base hidden in a groove and its apex protected by a short sheath. In most of the genera it is short and stout, but in *Ophiopterus* it is longer and more slender.

In the male the apex of the abdomen is more gradually narrowed and with two subtriangular clasps below. Difference in the shape of these has been given specific value by some, but this seems questionable. Between these and sometimes projecting below them is the short, stout penis.

Sexual distinctions.—Aside from the presence of an ovi-

positor in the female and distinct claspers—copulatory organs—in the males, there is little difference between the two sexes.

VARIATION.

Variation in color, venation and structure is noticeable in some members of this tribe, and especially in the genera *Ophion*, *Enicospilus* and *Eremotylus*. Here the color of the body varies in some species from luteous to ferruginous, or fuscous, and normally hyaline wings become tinged with fulvous or fuscous, while—in *Thyreodon*—the amount of black in the wings varies widely. The amount and strength of areolation of the metathorax, the character of the radial vein in *Eremotylus*, and that of the discocubital vein in *Ophion* vary considerably; the latter being in some species angularly broken and appendiculate to arcuate. The size of the ocelli has hitherto been considered constant and has been used as a specific character, but some specimens of *Athyreodon* and *Thyreodon* indicate that this is not entirely fixed. The number of frenal hooks has been used as a general specific character but varies considerably in a species, and often even on the two wings of a specimen.

So far as known there are no cases of mimicry in this tribe, but Dr. Ashmead thought that "*T. flammipennis* mimics some of the spider-killing wasps—*Ceropalidæ*—so common in its habitat."

ABNORMALITIES.

No records of abnormalities in this tribe have come to my attention, but while studying the group I have found several more or less abnormal specimens. One specimen of *Eremotylus macrurus* in the Massachusetts Agricultural College collection has an extra anterior wing on the left side, articulated just in front of the normal anterior wing.* This extra wing has the venation characteristic of the species and ap-

* The specimen was so dried that in spreading the wings to bring out the abnormality for exhibition the extra wing was broken off, but Prof. C. H. and Dr. H. T. Fernald testify to the validity of this abnormality.

parently, though both are of normal size or slightly larger, caused no trouble, for the specimen is otherwise normally developed and in good condition. Abnormal veins or stubs of veins (appendices) are not uncommon in either the anterior or posterior wing. The type of *Ophion abnormis* has an abnormal appendix in both anterior wings, extending from the lower part of the discocubital vein—below the angular fraxure—into the third discoidal cell. Another specimen of this species in the American Entomological Society collection has a similar abnormal appendix, but in the right wing only and nearer the angular fraxure. A specimen of *Eremotylus macrurus* from the same collection has in the right posterior wing an abnormal vein parallel to the upper part of the nervellus—above the fraxure—and connecting the discoidal and cubital veins, thereby forming an abnormal cell. In the left posterior wing this vein is present as two short appendices which do not quite connect in the middle. A specimen of *Ophiopterus ferrugineus* in the United States National Museum, and one of the cotypes of *Nototrachys annulicornis* has an abnormal appendix in both anterior wings extending from near the outer end of the radial vein into the second cubital cell.

GEOLOGICAL HISTORY.

Comparatively little is known of the geological history of the tribe, but specimens have been taken in the Tertiary and Quarternary. Serres records *Ophion* "from the lower Oligocene of the Tertiary at Aix in the Provence, Frankreich," and Sordelli records "*Ophion* or *Campolex* from the Quarternary at Pianico, Italy. Scudder states that the family Ichneumonidæ is well represented in Tertiary deposits, though no great number has yet been described. Most of these have been published under the generic names *Pimpla* and *Ichneumon*, the former being represented by seven species from Aix, Radoboj, amber, and British Columbia, and the latter by four, from Aix, Oeningen, Radoboj and Utah, besides which there are references to others in amber and at Aix."

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 Handlirsch, Die Fossilen Insekten, pp. 849, 1129.....1906-1908.

LIFE HISTORY AND HABITS.

Most of the different members of this tribe are often seen flying slowly about shrubbery or in the tall grass during the day from April or early May till late October, but in the tropics and occasionally even in parts of the United States they are taken at various times during the rest of the year. In cloudy or wet weather they seek some sheltered place—at least the diurnal species do—and very little is known of the nocturnal forms, *O. bifoveolatus*, etc. The “longtailed” and “purged” Ophions—*Eremotylus macrurus* and *Enicospilus purgatus*—*Ophion bilineatus* and *Thyreodon morio* are most commonly taken and are most abundant in most collections. The females are more common in museum material owing to their activity in searching for suitable hosts for their eggs, a fact well brought out by the Cornell trap-lantern records which show that only 87 males were taken to 485 females.

The method of oviposition is probably the same for all the members of this tribe, but the shape of the egg and the larval habits, though not well known, appear to vary somewhat, at least the records do not agree. Trouvelot describes the oviposition of *Eremotylus macrurus* as follows: “When an Ichneumon detects the presence of a worm she flies around it for a few seconds, and then rests upon the leaf near her victim; moving her antennæ very rapidly above the body of the worm, but not touching it, and bending her abdomen under the breast, she seizes her ovipositor with her front legs and waits for a favorable moment, when she quickly deposits a small, oval, white egg upon the skin of the larva. She remains quiet for some time and then deposits another egg upon the larva, which only helplessly jerks its body every time

an egg is laid." Dr. Felt adds that "eight to ten eggs are deposited in this manner on the skin, adhering by means of a cement or glue exuded at the moment of oviposition. A few days later they hatch and the larvæ eat their way under the skin of their victim, feeding on the fatty portions of the host at first, but later most of the tissues are devoured. The miserable victim of these parasites drags out a weary existence and usually perishes in the pupal state, rarely before. As a single victim will provide food for the development of but one or two parasites, the weaker ones perish."

Duncan's account does not quite agree with this, for he writes: "The Ophionidæ have a small ovipositor and deposit their eggs *either within* caterpillars that feed on leaves in broad daylight, and are unsheltered, or *upon their skins*. The eggs are somewhat remarkable and have been carefully examined. They are oblong, and have a long twisted peduncle, which is fixed in the skin of the victim. The young larva on hatching breaks its eggshell on the side remote from the peduncle, allows its body still to remain within the pedunculated shell and thus attacks the caterpillar in safety, not entirely leaving the eggshell till it has eaten a hole in the side of its victim." Dr. Packard's observations corroborate this statement for *Paniscus geminatus*, but Dr. Weed states that "the *Ophion* larva is known to feed externally as the nigger wasps, *Bembecidæ*, etc., the egg being strongly fastened to the skin of the victim." The views of Duncan and Weed may apply to some members of the subfamily Ophioninæ, but do not apparently to all members of the tribe Ophionini. The larva, a footless grub, feeds internally or semi-internally, first on the fat bodies, later upon other tissues, and as there is only enough food for one or two parasites the remainder die in the struggle. The host usually lives long enough to spin its cocoon and pupate, in which case the parasite does not need further protection, and often does not spin a cocoon. This habit is common with *E. macrurus* and others which prey upon hosts, spinning stout cocoons, such as the saturnians, etc. The parasite always causes the death of the host, and sometimes the host dies before it can spin up, in which case

- Fyles, Twenty-fifth Rept. Ent. Soc. Ont., p. 55, fig. 38.....1894.
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 Fiske and Thompson, Journ. Econ. Ent., II, pp. 450-460.....1909.

ECONOMIC IMPORTANCE.

The members of this tribe so far as known are beneficial parasites. Among them are some of our larger and more common parasites, to which much credit is due for controlling a number of insect pests. Most of the species attack lepidopterous larvæ, including the army worm, cotton worm, zebra caterpillar, the large cecropia larvæ, etc. *Ophion bifoveolatus*, however, apparently confines itself to white grubs, the larvæ of *Lachnosterna*.^{*} The host list of this tribe is very incomplete, especially for the tropical species, but the abundance of many of these indicates that they are important for they cause the death of the host always. *Ophion luteus*, a European form, has a host list of over thirty species, and some of the American members of the tribe may prove to have as many. Experiments at Cornell University show that several species, at least, are attracted to lights in large numbers, a fact which must greatly diminish the value of the trap lantern as a means for destroying insect pests, unless, as in the case with some moths, the female ophonines deposit most of their eggs before they will come to light.

DISEASE.

Mr. Bitterman, of Nuecestown, Texas, states that he "was stung on the neck by a specimen of *Paniscus geminatus* which had been attracted to a lamp. Serious inflammation soon resulted, which in a few days developed into a swelling. The swelling increased in size until it became a bag six or eight inches long, and the difficulty did not disappear for over six months, at one time seeming to threaten fatal results." In discussing this Dr. Ashmead states the he "has been stung by species of Ophoninæ several times, and be-

^{*} *Ophion* sp. is mentioned by Webster as a possible parasite of a sawfly (*Nematus* sp.).

lieves that ichneumon flies of the subfamily Ophioninæ may produce infection since the insects are attracted to decaying animal and vegetable matter, and might carry bacteria which cause blood poisoning." Walsh states that he "has repeatedly had his fingers pierced by the ovipositor of *Thyreodon morio* and always the puncture gave no more pain and produced no more inflammation than the puncture of a common pin." The members of this tribe will undoubtedly try to use the ovipositor if caught in the hand, and though the smaller species may not perhaps pierce the skin a painful wound could be made by one of the large forms. No poison is, however, injected into the wound, so that the sole danger is from bacterial infection, but in the tropics or under certain conditions elsewhere this deserves consideration. The literature relating to this subject is as follows:

<i>Ophion morio</i> , Walsh, Amer. Ent., I, p. 7	1868.
Ophioninæ Ashmead, Idem, p. 47.....	1896.
<i>Paniscus</i> Bitterman, Proc. Ent. Soc. Wash., IV, pp. 45-46.....	1898.
Ophionidæ Nuttall, Johns Hopkins Reports, VIII, Ins. and Diseases, Nos. 1-2, p. 41	1897.
<i>Ophion</i> Morley, British Ichneumons, I, p. 29	1903.

NATURAL ENEMIES.

At present only two members of this tribe are known to have effective enemies. Over 170 adults of a small chalcidid, *Encyrtus thyreodontis* Ashm., were reared by Mrs. A. K. Dimmock* from a cocoon of *Thyreodon morio*. Fiske and Thompson† report, from investigations at the Gypsy Moth Laboratory, that *E. macrurus* is frequently the victim of secondary parasitism, for the host furnishes food enough for only one parasite, and other parasites, threatened by starvation, attack the larvæ of *E. macrurus* if present. As instances of this they have reared *Theronia fulvescens* Cress.; *Spilocryptus extrematis*‡ Cress.; *Hemiteles periliti* Ashm.; a species of *Pimpla*

* Dimmock, Proc. Ent. Soc. Wash., IV, pp. 149, 153, 1898.

† Fiske and Thompson, Journ. Econ. Ent., II, p. 4601, 909.

‡ In the paper it is written *Spilocryptus extremis*, but there is no such species. Mr. Fiske states—in litt.—that "it is a lapsus for *P. extrematis* Cress. The specimens show the species to be apparently the form described by Cresson and usually placed as a synonym of *nunciatus* Say."

and a tachinid from *E. macrurus* within cocoons of *Samia cecropia* and *Callosamia promethea*. One larva of *Thyreodon morio* was apparently killed by a fungus which attacked its host, *Paonias (Smerinthus) excrucatus*. Other members of the tribe may be attacked by these or other enemies, but no cases are recorded. Birds, reptiles and amphibia are probably of little importance as enemies. *Eremotylus macrurus* frequently fails to make a proper pupa and Dr. J. B. Smith* records a case where "out of 76 cocoons of this insect only 19 adults were obtained, due not to hyperparasitism, but a simple failure of the larvæ to make a proper pupa." This experience, however, is not a new one, for in years past he "has cut *Ophion* cocoons in large numbers, finding sound larvæ and pupæ as exceptions only, and a putrid, brown, semi-fluid mass as a rule." Mr. Grossbeck states that he has never found anything but the same pasty mass, and therefore it seems that this parasite is kept in check by some disease that reaches it within the body of its host. There is room here, however, for considerable investigation.

Genus **AGATHOPHIONA** Westw.

Agathis, nom. propr. Hym.; *Ophion*, nom. propr. Hym.

Agathophiona Westwood, Tijdschr. v. Ent., Vol. XXV, p. 29.....1882.

" Cameron, Biol. Centr. Amer., Hym., I, p. 298, No.

1, pl. 12, fig. 111886.

" Ashmead, Proc. U. S. Nat. Mus., No. 1206, pp. 89,

162 (Vol. XXXIII, 1901).....1900.

" Dalla Torre, Cat. Hym., III, p. 179.....1901.

" Szepligeti, Gen. Ins.; Hym., 34^{me} Fasc., p. 29.....1905.

Body elongate; abdomen long and compressed, but stouter and thicker than in *Ophion*; head buccate; labium greatly lengthened, bipartite, lobes filiform; neuration of wings similar to *Ophion*; claws pectinate.

Generic type.—♂. *A. fulvicornis* Westw. (monotypical). Location unknown.†

* Smith, Journ. Econ. Ent., I, No. 5, pp. 293-297, 1908.

† It is not in the British Museum and is perhaps destroyed, but may possibly be at Oxford.

Westwood gives the following generic description :

"Body (male) elongate, abdomen long, compressed, slightly clavate at the apex, petiole and second segment following as long as thorax, the two apical lobes horny, compressed, longer than the preceding segment. Head transverse; narrow in front, the sides, behind the eyes, rounded. Antennæ as long as the body; labium short, transverse; mandibles curved, apices deeply bifid; maxillæ elongate slender, ciliate; maxillary palpi long, slender, five-jointed, the joints of nearly equal length; last segment slender (a very minute segment not seen by me ?); mentum of maxillary long, labrum very long, bipartite, lobes filiform, rostrum slender, curved, more than four times as long as the mentum; labial palpi slender, with four joints of equal length, the apical segment most slender. Thorax obovate, head as wide as the thorax. Wings colored; the anterior with the small second marginal cell (areolet) wanting, the first submarginal area (cubital) confluent with the discoidal."

This genus was erected by Westwood for a single species which is still almost unknown, and has been taken but once since the original description.

Agathophiona fulvicornis Westw.

<i>Agathophiona fulvicornis</i>	Westwood, Tijdschr. v. Ent., Vol. 25,
	p. 19.....1881.
"	" Cameron, Biol. Centr. Amer., Hym., I,
	p. 1, ♂, Pl. XII, f. 111886.
"	" Dalla Torre, Cat. Hym., III, p. 179.....1901.
"	" Szepliget, Gen. Ins., Hym., 34 ^{me} Fasc.,
	p. 29, n. 1.....1905.

"Male, black, shining, antennæ fulvous, except the two basal segments which are black; legs black, tarsi fuscoluteous, the two posterior tibiae fuscous; wings blackish fuscous, veins black."

Length, 18.5 mm.; wings spread 26 mm.

I have not seen a specimen of this species, and can only give a translation of the original description.

Type.—♂. Location unknown.*

According to Cameron's plate the discocubital vein is arcuate as in *Thyreodon*, the nervulus slightly postfurcal, nervellus broken above the middle and the wings fuliginous.

Distribution.—Mexico (San Angel, Chapultepec).

This species is apparently tropical, but its range is not as yet known.

* It is not in the British Museum but may be at Oxford.

Location of specimens.—I do not know what became of Cameron's specimens of this species, but they are not in the British Museum, and no others are recorded.

Genus **OPHION** Fabr.

<i>Ophion</i> Fabricius, Suppl. Ent. Syst., pp. 210, 235.....	1798.
“ “ Syst. Piez., p. 113, n. 18.....	1804.
“ Olivier, Encycl., Meth., VIII, p. 506.....	1811.
“ Gravenhorst, Ichn. Europ., III, pp. 686–706	1829.
“ Brullé, Hist. Nat. Ins., Hym., IV, pp. 75, 76, 137.....	1846.
“ Holmgren, Öfvers. K. Vet. Akad. Förhandl., I, 15, pp. 321–330	1858.
“ Norton, Proc. Ent. Soc. Phila., I, p. 558.....	1863.
“ Gerstaecker, Handbuch der Zoologie, p. 210	1863.
“ Kirchner, Cat. Hym. Europ., p. 86, App., p. 11	1867.
“ Cresson, Proc. Acad. Nat. Sci. Phila., 1873, p. 374.....	1874.
“ Taschenberg, Zeitschr. f. d. Ges. Natur., 46, pp. 421–438.....	1875.
“ Vollenhoven, Pinacographia, pp. 44, 61; pl. 28, figs. 1–6; pl. 39, figs. 1–8	1880.
“ Provancher, Faun. Ent. Can., Hym., IV, pp. 348–350.....	1883.
“ Packard, Proc. Bost. Soc. Nat. Hist., 21, p. 18.....	1883.
“ Bridgman and Fitch, The Entomologist, 17, pp. 26, 178	1884.
“ Cameron, Biol. Centr. Amer., Hym., I, pp. 290, 293	1886.
“ Cresson, Syn. Hym. N. A., pp. 43, 149, 200.....	1887.
“ Riley, Ius. Life, I, p. 98.....	1888.
“ Thomson, Opusc., Ent., 12, p. 1187.....	1888.
“ Brauns, Arch. Ver. d. Nat. Mecklenb., pp. 75, 86.....	1889.
“ Webster, Ins. Life, IV, p. 179.....	1891.
“ Ashmead, Smith's Ins. N. J., p. 580 (second edition).....	1899.
“ “ Proc. U. S. Nat. Mus., No. 1206, pp. 87, 180 (Vol. XXIII, 1901).....	1900.
“ Dickinson, Moths and Butterflies, p. 177, fig. 160.....	1901.
“ Dalla Torre, Cat. Hym., III, p. 187.....	1902.
“ Eliot and Soule, Caterpillars and Their Moths, p. 257.....	1902.
“ Felt, N. Y. State Mus., Bull. 76, pp. 101, 113 (nine- teenth State Ent. Rep.).....	1903.
“ Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., pp. 22, 29.....	1905.
“ Schmiedeknecht, Hym. Mitteleurop., p. 593, 110.	1907.
“ “ Opusc. Ichneum., XVIII, p. 1438.....	1908.
“ Morley, The Entomologist, XLII, p. 136, June	1909.
“ Viereck, Smith's Ins. N. J., p. 621 (third edition).....	1910.

Anterior wing with distinct stigma, discocubital vein usually angularly broken and appendiculate, base of radius straight, not thickened, radial and cubital veins usually

strongly converging, nervellus usually broken below the middle; antennæ long, filiform; wings without areola or macula, discocubital cell receiving both recurrent veins; intermediate tibiæ with two apical spurs, claws pectinate; abdomen usually strongly compressed.

Generic type.—*O. luteus* L.*

The American members of this genus are medium sized insects compared with others of the tribe, smaller than the Thyreodons or Athyreodons. They are usually flavo-fulvous, sometimes marked with fuscous or black, and closely resemble members of the Genus *Paniscus*, but may be readily separated by the presence of an areolet in the latter. In most Ophions the discocubital vein is angularly broken and appendiculate, but in *bifoveolatus*, *chilensis* and a few others this vein is frequently only angularly bent or almost arcuate and the appendix rudimentary or wanting. In these species the ocelli are nearly as small as in *Thyreodon*, and the nervellus, is often broken above the middle, but the presence of a distinct stigma places them at once in the Genus *Ophion*, for in *Thyreodon* the stigma is lacking. Members of the Genus *Eremotylus* may be readily separated by characters of venation; the basal half of the radius being thickened and the third discoidal cell long and narrow, while it is short and broad in *Ophion*. This, the oldest genus of the tribe, was proposed by Fabricius in 1798 and characterized as follows:

“Mouth with clypeus short, rounded, entire; four unequally elongated, filiform palpi, the anterior longer, with six cylindrical segments; the maxillæ attached behind to the posterior which are four-jointed and attached to the top of the labium above. Mandibles horny, curved, bidentate. Maxillæ short, membranaceous, entire. Labium short, ovate, membranaceous, entire, attached to the palpiger. Antennæ setaceous.”

Twenty-one species were designated and given the usual short descriptions of the day. Many of these, *luteus*, etc., are well known and still retained in the Genus *Ophion*, but quite a number—among which are the American species described, *flavus*, *morio* and *relictus*—have been removed to

* Designated by Curtis, Brit. Ent., 13, p. 600, 1836; Westwood' Generic Synopsis, p. 60, 1839.

other later genera. Other genera were eventually proposed and the genus gradually narrowed down to its present limits. From this it will be seen that the Genus *Ophion* originally covered, intentionally or otherwise, a field nearly as wide as that now covered by the subfamily Ophioninæ. In 1829 Gravenhorst revised the Superfamily Ichneumonoidea, and Brauns accepted many of his views, giving in 1889 the following characters for this genus :

"Head short, transverse, clypeus hardly discernible, foveola distinct on both sides, apex truncate. Mandibles equally bidentate, antennæ rufous, metathorax rarely distinctly areolated, generally with two transverse basal carinæ, sometimes abbreviated or not interrupted behind ; front wings with basal and cubital veins strongly converging ; broken in the middle, very often giving off a branch. Mesosternum with median half emarginate, the two basal segments with deep foveæ. Claws pectinate."

On another page he adds :

"Wings without areola, discocubital cell receiving both recurrent nervures, generally angularly broken, with an appendix ; cubital and basal veins strongly converging."

Schmiedeknecht summarizes this in his recent work on Hymenoptera of Middle Europe, but credits the genus to Gravenhorst, evidently basing this view on Gravenhorst's revision and considering the *Ophion* of Fabricius as a subfamily. This view can not, however, be accepted ; the Genus *Ophion* was in all of its revision credited to Fabricius and the International Code of Nomenclature offers no excuse for change.

Distribution.

The members of this the largest genus in the tribe are found all over the world. The American species are widely distributed from southern Alaska to Patagonia, Argentina, including the West Indies. *O. bilineatus* has the widest range, apparently occurring over all the above named American territory, but the other species are more restricted.

Life History and Habits.

Comparatively little is known of the life history or habits of members of this genus in spite of the fact that they are

common and widely distributed. This is probably due to the crepuscular or nocturnal habits of the majority. *O. bifoveolatus* is an exception, but the others, so far as known, fly at night or in the evening and are often attracted to light. The adults appear in early spring, and have been taken in Massachusetts from early April till late October, but are most abundant in June, July and August. The date of emergence will probably be earlier for tropical countries, but so far as known the winter is passed in the larval or pupal state. The cocoons are about half an inch long by a quarter of an inch thick in the middle, slightly flattened, oval in shape, composed of brownish silk, sometimes darker towards the ends. The habits probably differ little from those of other members of the tribe which are treated on page 14.

Economic Importance.

The economic importance of this genus can not be estimated, for our knowledge of their hosts is too limited, but so far as known they are, with one exception, restricted to Lepidoptera. *O. luteus*—a European form—has a host list of twenty-nine or more insects, and there is no reason why the American species, especially such a widely distributed form as *O. bilineatus*, should be more restricted. *O. bifoveolatus* forms a noteworthy departure from the other members of the tribe, and apparently preys entirely upon white grubs—the larvæ of *Lachnosterna fusca* and perhaps other species of this genus. Prof. F. M. Webster records having observed an insect resembling an Ophion ovipositing in the larva of a sawfly—*Nematus* sp.—but there is doubt as to the identity of the parasite, and this would be the only known case of an Ophionine parasitizing a hymenopteron.

Variation.

The members of this genus show no striking variation in structure or color, and several of the species are so closely related that it is only after careful study that they can be separated. The shape of the discocubital cell and character of the surface of the metathorax show in some species considerable variation. The discocubital vein is normally angu-

larly broken and appendiculate, but a good series of *O. bifoveolatus*, *chilensis* and a few others shows at once that in these species it is sometimes only angularly bent or almost arcuate and the appendix rudimentary or entirely wanting. The character of the surface of the metathorax also varies markedly, as in *bilineatus*, where it varies from smooth or slightly reticulate to distinctly reticulate. The ocelli are normally medium sized, but in *O. costale* they are as small as in *Thyreodon*.

TABLE OF SPECIES.

1. Wings subfuliginous or fuliginous.....2.
Wings hyaline, only slightly fuscous or fulvous.....6.
2. Discocubital vein arcuate, nervellus broken at or above the middle..3.
Discocubital vein angularly broken or appendiculate, nervellus
broken at or below the middle5.
3. Posterior ocelli connected with the tops of the eyes by a deep black
furrow.....**costale** Cress.
Posterior ocelli not connected with the tops of the eyes by a deep
black furrow4.
4. Eyes small, thoracic sutures, pleuræ, pectus and mesothorax partly
black.....**bifoveolatus nigrovarius** Prov.
Eyes not small, thoracic sutures not marked with black.
5. Abdomen long and slender, antennæ shorter than the body.
bilineatus elongatus n. subsp.
Abdomen not long and slender, antennæ longer than the body.
slossonæ Davis.
6. Abdomen stout, not strongly compressed; eyes small, distant from
the base of the mandibles.....**bifoveolatus** Br.
Abdomen usually strongly compressed.....7.
7. Eyes small, distant from base of mandibles8.
Eyes not small, not distant from base of mandibles12.
8. Base of discocubital vein twice angularly broken, appendix directed
downward.....**abnormis maginiceps** n. subsp.
Base of discocubital vein not twice angularly broken, appendix
not directed downward9.
9. Antennæ black.....**melanostigma** Cam.
Antennæ not black.....10.
10. Ocelli small, the posterior connected with the tops of the eyes by a
deep black furrow.....**bilineatus nigrovarius** Br.
Ocelli not small, not connected with tops of eyes by a deep black
furrow11.
11. Wings hyaline (or slightly fuscous).....16.
Wings with distinct fulvous tinge.....**coloradensis** Felt.

Thorax polished, sericeous, with deeply impressed, black sutures; the posterior suture of the metapleuræ finely beaded; scutellum rounded; metathorax smoothly rounded behind, without distinct carinæ; wings subhyaline, fulvo-ferruginous, stained with yellowish at the base and with fuscous along the costal and apical margins, deepest in the radial and marginal cells stigma well developed, flavous; discocubital vein evenly bent, not appendiculate, nervulus slightly postfurcal, nervellus broken well above the middle; first recurrent vein not over half the length of the second, basal vein slightly bent at its lower end, towards the base of the wing; legs ferruginous, except the anterior and median trochanters and the articulation of the trochanters and coxæ, which are black; claws pectinate.

Abdomen strongly compressed, slightly darker colored and varied with black.

Redescribed from the type and one additional female specimen.

Type.—♀. No. 63, American Entomological Society of Philadelphia.

This species is closely related to *O. bifoveolatus*, and may prove to be only a subspecies. Mr. E. T. Cresson described this species from a single female, which has long stood as unique, and consequently has been regarded as possibly a sport. On examining the ♀ type of *Genophion gilletti* Felt, however, I found that it was synonymous, and the existence of this second specimen shows that the characters are fairly well fixed. Dr. Felt erected for this and another species a new genus—*Genophion*—based on "the very elongated face," but this occurs in other species and genera to an equal degree, and can not, I believe, be given generic value. The apparent length of face is largely due to the decrease in the size of the eyes and is frequently seen in the specimens of *O. bifoveolatus*.

Distribution.—This rare species is recorded as having been taken in Klamath County, Cal.,* and Colorado, but as it is represented by only two specimens its range is not known.

Nothing is known of the life history, habits or hosts.

* There is no Klamath County, Cal., so this must refer to the town of Klamath in the northwestern corner of California County, Oregon, which lies on California's northern border.

be considered only a subspecies ; breeding experiments may show that it is only a melanic form of *bifoveolatus*, for the structure agrees throughout, but until we have such evidence it seems wise to preserve it as a subspecies. Provancher states that the female is of a clearer yellow than the male, but I do not have sufficient material to settle this.

Distribution.—This subspecies has a somewhat limited distribution through the northern United States and southern Canada. Its exact range is not known, but it has been reported, and I have seen specimens, from Colorado and Canada.

Location of specimens.—American Entomological Society (Philadelphia Academy of Natural Sciences), Canada, Colorado. U. S. National Museum, Canada, Colorado.

***Ophion subfuliginosus* Ashm.**

<i>Ophion subfuliginosus</i> Ashmead, Proc. Cal. Acad. Sci., IV, p. 126,	
n. 11, ♀ ♂, El Taste, El Chinche,	
Lower California.....	1894.
“ “ Dalla Torre, Cat. Hym., III, p. 199.....	1901.
“ “ Szepliget, Gen. Ins., Hym., 34 ^{me} Fasc., p.	
32, n. 21.....	1906.

Brownish ferruginous ; wings subhyaline, stigma fulvous, nervures black, discocubital vein angularly bent, not appendiculate, nervulus ante-furcal to interstitial, nervellus broken well below the middle.

Length, 12–16 mm. ; wing, 8–12 mm. ; spread, 17.5–25 mm. ; antennæ, 12–18 mm.

Brownish ferruginous ; head transverse, polished, impunctate, except the face and clypeus which are very finely punctured and clothed with fine white pubescence ; ocelli large, the posterior close to the tops of the eyes ; eyes slightly emarginate ; antennæ as long as the body or a little longer, the first flagellar segment as long as or longer than the scape ; clypeus with a cluster of long hairs, and separated from the face by deep foveæ ; labrum triangular.

Thorax smooth, polished, or at the most with sparse microscopic punctures, scutellum tinged with yellow, bordered by lateral keels connecting it with the mesonotum ; metathorax and lower part of the mesopleuræ closely punctate, the posterior face of the mesothorax with two arcuate transverse carinæ and two median longitudinal carinæ which form a shallow median longitudinal furrow.

Wings tinged with fuscous, especially in the radial cell ; stigma fulvous,

nervures fuscous to black, sometimes varied with flavous; discocubital vein obtuse-angularly bent or broken, but without trace of an appendix; nervulus antefurcal to interstitial, nervellus broken at or below the middle; first recurrent vein not over half the length of the second; legs of general color, claws pectinate.

Abdomen about two and one-half times as long as the thorax, compressed, smooth, and shining, clothed with fine short pubescence, the first segment one-third longer than the second.

In describing this species I have compared the types and three ♀ specimens with the original description.

Types.—♂ ♀. No. 6138, U. S. National Museum.

This is one of the smaller, rarer, species, which is not well known. It may be readily recognized by its small size, wings tinged with fuscous, and the discocubital nervures not appendiculate. A larger series may show that the discocubital vein is, as in *bifoveolatus*, sometimes appendiculate.

Distribution.—Lower California, New Mexico.

This species appears to range through southwestern United States and northern Mexico. The types were taken at El Taste and El Chinche, Lower California, Mexico, and two ♀ specimens in the National Museum come from San Jose del Cabo, Lower California, while a specimen in the American Entomological Society Museum, which seems to belong here, comes from New Mexico. Nothing is known of the life history, habits or hosts.

Location of specimens.—U. S. National Museum, cotypes ♀, No. 6138, El Taste, Lower California, Mexico; ♀, No. 6138, El Chinche, Lower California, Mexico; two ♀'s, San Jose del Cabo, Lower California, Mexico; one, Virginia. American Entomological Society, ♀, New Mexico.

***Ophion bilineatus elongatus* n. subsp.**

Fulvo-ferruginous, abdomen long and slender, antennæ short, wings subfuliginous, discocubital vein angularly broken, appendiculate; nervulus antefurcal to interstitial, nervellus broken at or near the middle.

Length, 24-29 mm.; wing, 14-17 mm.; spread, 30-36 mm.; antennæ, 13-16 mm.

Fulvo-ferruginous, smooth and shining, with scanty, short white pubescence; head of the general color, the eyes frequently surrounded by a narrow band of fulvous; ocelli large, well separated; eyes large, emarginate; antennæ shorter than usual, ferruginous, their tips

slightly darker; clypeal foveæ distinct; mandibles stout, bidentate, tipped with black.

Thorax of the general color, smooth and shining or at the most with microscopic punctation; mesonotum with its parapsidal furrows distinct only at the anterior edge; metathorax with two transverse carinæ, the anterior even, the median angularly arched and behind it several indistinct carinæ radiating from the insertion of the abdomen.

Wings distinctly smoky, stigma flavous, nervures black; discocubital vein appendiculate, nervulus antefurcal to interstitial, nervellus broken at or near the middle.

Legs of the general color or slightly lighter; abdomen often varied with black, long and slender, strongly compressed.

Described from three ♀ cotypes.

Cotypes.—Three ♀'s, American Entomological Society.

This subspecies may be readily recognized by the long slender abdomen, which I have not seen in any other species. This, with the subfuliginous wings and reddish-brown color, makes it conspicuous in a series of *Ophions*. In structure and color, aside from the long slender abdomen, it agrees with dark specimens of *bilineatus*.

Distribution.—Colorado.

Ophion slossonæ* Davis.

- Ophion slossonæ* Davis, Ent. Mus., IV, p. 135, ♀, orig. descrip.
 Conn.; Carbondale, Ill. 1893.
 " " Ashmead, Trans. Amer. Ent. Soc., XXIII, p. 193.
 (apparently a syn. of *T. texanus* Ashm.) 1896.
 " " Dalla Torre, Cat. Hym., III, p. 198, listed 1901.
 " *ferrugipennis* Felt, N. Y. Mus., Bull. 76 (nineteenth Rept.
 State Ent.), p. 122, pl. 2, fig. 1, N. Y. 1903.
 " *slossonæ* Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32, n.
 120, listed 1905.

Ferruginous to fulvo-ferruginous, wings tinged with fuscous or entirely deep fuliginous, discocubital vein appendiculate, nervures black, stigma fulvous.

Length, 19–25 mm.; wing, 18–22 mm.; spread, 38–46 mm.; antennæ, 22–28 mm.

Fulvo-ferruginous to ferruginous, clothed with fine short pubescence,

* Mr. Davis writes: "I take pleasure in dedicating this new species of *Ophion* to Mrs. Annie T. Slosson who bred the specimen from a dark cocoon of one of the larger species of *Acronycta* (*Apatela*) last season (1882). The parasitized cocoon was taken in Connecticut."

face finely punctured; eyes large, slightly emarginate, surrounded by an irregular yellow band; vertex varied to flavous; ocelli large, prominent, well separated, in one case by a distinct furrow, the two posterior close to the tops of the eyes; antennæ as long as body, fulvo-ferruginous, apex sometimes fuscous; clypeal foveæ distinct; mandibles bidentate, tipped with black.

Thorax and abdomen frequently dark ferruginous.

Thorax sericeous, shining; parapsidal furrows well developed anteriorly, extending back one-third the length of the mesonotum; scutellum connected with the mesonotum by more or less prominent lateral keels; metathorax areolate, with two transverse and six or eight longitudinal distinct keels, the latter emanating from the insertion of the abdomen, the latter edge of the third median area frequently separated by an extra keel.

Wings slightly fuscous to deep fuliginous, iridescent, often with dark spots in the radial cell of the hind wing; stigma and base of costa fulvous, nervures otherwise fuscous; discocubital vein angularly broken and appendiculate, the appendix extending one-third to one-half way across the cell; nervulus antefurcal to interstitial; nervellus broken at or below the middle; first recurrent vein not half the length of the second. Legs fulvous to light ferruginous, usually lighter than the rest of the body, posterior tarsi sometimes marked with black, claws pectinate, black.

Abdomen strongly compressed, apex usually darker.

Redescribed from ♂ type, eight ♀ and five ♂ specimens.

Type.—♂, No. 81, and paratype, ♂, No. 81, American Entomological Society, Philadelphia.

This species is related to *Ophion bilineatus*, but may be easily recognized by the more or less fuliginous wings, stronger and differently arranged areolation of the mesothorax and larger size. It has been confused with *Eremotylus texanus* Ashmead, and Dr. Ashmead (Transactions American Entomological Society, 23, 193) thought it "apparently a synonym of that species." They are, however, distinct, and belong to different genera, as the different venation, areolation of metathorax, etc., show. This might have been learned by a careful study of the original descriptions, but comparison of the types and a good series of specimens leaves no room for doubt. Similarity of description indicates that *Ophion ferruginipennis* Felt is a synonym of *O. slossonæ*, and the types which I have examined show that this is the case.

Distribution.—Grand Lake, Newfoundland, to Williamsport, Pa., and Carbondale, Ill.

This species ranges from the lower Boreal at 45° to the lower edge of the Upper Austral at 38°, and possibly into the Lower Austral zones. I have seen specimens taken at Grand Lake, Newfoundland; Amherst and Cohasset, Mass.; Connecticut; Ithaca and New York City, N. Y.; Williamsport, Pa., and Carbondale, Ill.

Life history and habits, etc.—Little is known of the life history and habits of this species. It has been taken from June 2 to September 7, but seems to be most abundant in August and September. Its value as a parasite can not be determined as the list of hosts is very incomplete. The type was "bred from a dark cocoon of one of the larger species of *Apatela* (*Acronycta*); the parasitized cocoon was taken in Connecticut."

Location of specimens.—American Entomological Society (Philadelphia Academy of Natural Sciences), type ♂, No. 81, one, Connecticut; paratype, ♂, No. 81, two, Carbondale, Ill. U. S. National Museum, homotype, ♂; Boston Society Natural History, eight ♂'s, three ♀'s. Leland Stanford University, homotype, ♀, Ithaca, N. Y. Minnesota State College, ♀, Minnesota, wings light. New York State Museum, Albany, ♀, New York City. Massachusetts Agricultural College, homotypes, two ♂'s and two ♀'s, Amherst, Mass.

***Ophion bifoveolatus* Brullé.**

<i>Ophion bifoveolatus</i>	Brullé, Hist. Nat. Ins., IV, Hym., p. 138, ♀	
	♂.....	1846.
"	" Cresson, Proc. Ent. Soc. Phila., I, p. 206, Md.,	
	Ark., Ill.....	1862.
"	" Norton, Proc. Ent. Soc. Phila., I., p. 358, N. Y.,	
	5.....	1863.
"	" Cresson, Proc. Ent. Soc. Phila., IV, p. 284, Colo.	1865.
"	" " Trans. Ent. Soc. Phila., IV, p. 169,	
	Texas.....	1873.
"	" Provancher, Nat. Can., VI, p. 103.....	1879.
"	" " Idem, XI, pp. 117, 118.....	1879.
"	" " Faun. Ent. Can., II, Hym., p.	
	351, n. 4, ♀ ♂, Can	1838.

- Ophion bifoveolatus* Ashmead, Colo. Biol. Assn., Bull. I, p. 43,
Colo.....1890.
- “ “ Ashmead, Smith's Cat. Ins. N. J., p. 25 (also
1900 edition, p. 581).....1890.
- “ *bifoveolatum* Forbes, Ins. Ill., 18th Rept., p. 125.....1891-2.
- “ “ Osborn, Partial Cat. Animals of Ia., p. 15.....1892.
- “ “ Riley, Proc. Ent. Soc. Wash., II, p. 134.....1892.
- “ “ Slosson, Ent. News, V, p. 4, Alpine regions
of Mt. Washington.....1894.
- “ *bifoveolatum* Forbes, Ill. Agr. Exp. Sta., Bull. 44, p. 272.....1896.
- “ *bifoveolatus* Dalla Torre, Cat. Hym., III, p. 188, Am. bor.....1901.
- “ *bifoveolatus* Felt, N. Y. State Mus., Bull. 76, p. 119, pl.
II, fig. 2.....1904.
- “ *bifoveolatus* Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32,
n. 112, Am. bor.....1905.
- “ *bifoveolatum*, Forbes, Ill. Agr. Exp. Sta., Bull. 116, p. 473.....1907.
- “ “ Felt, N. Y. State Mus., Bull. 124, p. 43.....1908.
- “ “ Forbes, 24th Rept. Ill. State Ent., p. 161,
bred from white grubs.....1908.
- “ “ Viereck, Smith's Ins. N. J., p. 621.1910.

Fulvo-ferruginous, eyes small, distant from base of the mandibles, abdomen not strongly compressed, discocubital vein rarely appendiculate, costal vein inclined to black.

Length, 12-22 mm.; wing, 9-17 mm.; spread, 20-36 mm.; antennæ, 12-17 mm.

Light fulvous to ferruginous, face broad, frequently fulvous, ocelli prominent, equidistant; eyes small, distant from the base of the mandibles, very slightly emarginate; antennæ dark brown, their apices frequently darker, stout, not as long as the body; clypeal foveæ deep, usually black.

Thorax fulvous to ferruginous, finely punctured, with the sutures sometimes darker; mesonotum convex, usually smooth.

Scutellum and postscutellum prominent, the former sometimes light ferruginous; metathorax with a weak median transverse carina and behind it several weak median longitudinal carinæ, all of which are more or less distinct.

Wings hyaline or tinged with fuscous; stigma well developed, fulvous; nervures black; discocubital vein angularly bent but usually without an appendix, though a trace of one is frequently present, and sometimes a distinct appendix; bulla of the second recurrent vein usually close to the tip of the discocubital vein; nervulus interstitial to ante-furcal; nervellus broken above the middle.

Legs uniformly fulvo-ferruginous; claws pectinate.

Abdomen not strongly compressed, but relatively thicker and shorter than usual; rarely considerably compressed; often darker at the tip; male clasps stout, rather long, obliquely rounded.

In describing this species I have compared numerous specimens with the descriptions.

Type.—♀ ♂. Location unknown to me.

This species is readily recognized by the small eyes, broad face, abdomen not strongly compressed and discocubital vein generally not appendiculate; there is the usual variation towards the light and dark forms. Brullé's type was evidently one of the lighter forms in which the head, thorax, and sometimes the legs and first abdominal segment are light fulvous, the rest ferruginous; the dark forms are entirely ferruginous, and between these are all sorts of gradations. The thorax is sometimes marked with black, and *O. bifoveolatus nigrovarius* is evidently an extreme case of this.

Distribution.—This species is generally distributed throughout the United States, ranging from southern Canada to northern Mexico.

Specimens have been taken in Ottawa, Canada; Mt. Washington, N. H.; Pennsylvania; California; Illinois; Montana, and many intervening localities.

Life history.—This species is one of the most common of the genus and well represented in collections; this is partly due perhaps to the fact that it seems to be diurnal, and not crepuscular or nocturnal as is the case with some closely related forms; in the Cornell trap-lantern experiments very few specimens, compared with the newly related *O. bilineatus* Say, were taken. The adults usually appear about the middle or last of May and early in June, but specimens have been taken in Massachusetts as early as May 4; at Ottawa, Canada, May 30; at Palo Alto, Cal., March 25; and in Illinois, March 11 and April 27 to September 1. They are probably most abundant in June and July, but Prof. Forbes states that in Illinois they emerge in breeding cages from March 31 to April 27. Little is known of its life history, but it is somewhat peculiar in being parasitic upon white grubs—the larvæ of *Lachnosterna fusca* and probably of other species. In one case the head and skin of a grub were woven into the wall of the cocoon of the parasite. A specimen in the Massa-

chusetts Agricultural College collection—from the Gypsy Moth Laboratory in Malden—emerged, according to the label, from a *promethea* cocoon. This, however, seems doubtful, and can not be accepted without further evidence. It has been frequently reported as parasitic upon *Lachnosterna fusca*, and its activities may account for these insects not becoming more serious pests. The cocoon is about a half inch long by a quarter thick in the middle, made of dull gray silk, frequently darker towards the ends, and thus forming a median band of lighter color.

Hosts.

Lachnosterna fusca Froh.; Riley, Proc. Ent. Soc. Wash., II, p.

134.....1892.

Callosamia promethea Drury, noted above.

Location of specimens.—Colorado State College, Leland Stanford University, Iowa State College, Illinois State College, Massachusetts Agricultural College, Minnesota Agricultural College, Montana Agricultural College, New York State Museum, American Entomological Society, U. S. National Museum. In the U. S. National Museum from Canada; Hartford, Conn. (May 30); New York; Pennsylvania; Virginia; Colorado; Missouri and Texas.

Ophion abnormis magniceps n. subsp.

Flavous to dark fulvous, varied with ferruginous; head large; eyes small, distant from base of mandibles; discocubital vein biangularly broken, and appendiculate, the appendix or its rudiment directed downward; stigma and costa flavous bordered with black below, nervures black; veins enclosing the cell thickened, those at the apex very slender.

Length, 12-16 mm.; wing, 11-13 mm.; spread, 24-28 mm.; antennæ (missing).

Flavous to dark fulvous, varied with ferruginous; smooth and shining, with fine short pubescence; head large, face broad; ocelli medium to small, distant from the tops of the eyes; eyes small, narrow, only slightly emarginate, distant from the base of the mandibles; antennæ fulvous, probably shorter than the body; clypeal foveæ deep; mandibles bidentate, tipped with black.

Thorax smooth and shining; mesonotum with more or less distinct ferruginous stripes, metathorax smooth or very finely punctured, with indistinct carinæ.

Wings hyaline or slightly tinged with fuscous; stigma and costa flavous, bordered with black below; nervures black, those enclosing the cell thickened, those at the apex beyond the closed cells slender and—except from the radial vein—even somewhat indistinct at the outer end; base of radial vein straight and slender; discocubital nervure twice angularly broken and appendiculate, with its appendix directed downward; nervulus well antefurcal to interstitial, nervellus broken below the middle; legs light to dark flavous, claws pectinate; abdomen flavous to dark fulvous, more or less varied with black.

Described from ♀ and ♂ types.

Types.—♀ ♂. American Entomological Society Collection.

This subspecies is closely related to *O. abnormis*, having the large broad head, small eyes, etc., but it may be readily separated from that species by characters of the venation. The basal nervures, as far as the apex of the closed cells, are noticeably thickened throughout, while those beyond are more slender than usual, and in their outer ends may almost disappear (except for the radial). The shape of the third discoidal cell and the discocubital vein, twice angularly broken with the appendix pointed downward, are also quite different. I am not satisfied that these characters are all well fixed, but a series of specimens would settle this point. If the characters are well fixed I believe that they are of specific value, but in the absence of such evidence I can only place this insect as a subspecies.

Distribution.—This subspecies appears to have a similar range to *abnormis*, along the mountain ranges of the western United States; the cotypes come from Montana and southern California. Nothing is known of the life history, habits or hosts.

Location of specimens.—American Entomological Society. Cotypes ♀ and ♂, southern California, Montana.

***Ophion melanostigma* Cam.**

- Ophion melanostigma* Cameron, Biol. Centr. Amer., Hym., 1, p.
 293, n. 14, ♂, pl. 12, fig. 18 1886.
 “ “ Dalla Torre, Cat. Hym., III, p. 195 1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
 32, n. 105 1905.

Luteous, eyes and thorax sulphur-yellow, antennæ black, wings hyaline, stigma and nervures black.

Length, 23 mm.

Head strongly punctured, a longish, clearly defined tubercle below the antennæ; antennal regions projecting, separated from the eyes by an oblique depression which extends near to the inner side of each antenna; tips of the mandibles piceous black; antennæ longer than the body, densely pilose, the third joint longer than the fourth and fifth together, black, with the apical joints brownish; thorax pilose, shining, impunctate; metanotum without keels.

Wings hyaline, stigma and nervures black; discocubital vein arcuate, not appendiculate; bulla received a little beyond the middle; nervulus interstitial, nervellus broken below the middle.

I have not seen the type or a specimen of this species, and can only give the slightly modified original description.

Type.—British Museum.

This species may apparently be readily recognized by the black antennæ and arcuate discocubital vein, though these may vary to some extent.

Distribution.—Panama (Volcan de Chiriqui, 2,000–3,000 feet).

Ophion coloradensis Felt.

Genophion coloradensis Felt, New York State Mus., Bull. 76, p.

124, ♀ (nineteenth Rept. State Ent.).....1904.

Ferruginous, thoracic sutures black, eyes small, wings hyaline tinged with fulvous, discocubital vein angularly broken and appendiculate.

Length, 9–12 mm.; wing, 9–12 mm.; spread, 20–25 mm.; antennæ, 13 mm.

Ferruginous; ocelli small, nearly contiguous, the posterior distant from tops of eyes their own diameter; eyes small, distant from the base of the mandibles, only slightly emarginate; antennæ fulvous, about as long as the body; clypeal foveæ deep, dark brown.

Thorax ferruginous with sutures black, metathorax with three well-developed carinæ, one dorsal, two lateral, radiating from the insertion of the abdomen; wings hyaline, basal half tinged with fulvous; stigma flavous, nervures fulvous, discocubital vein angularly broken and more or less distinctly appendiculate—in one type only a notch, and in the other well marked—nervulus antefurcal to interstitial, nervellus broken below the middle; first recurrent vein about one-half the length of the second; bulla of second recurrent vein near the discocubital vein, that of the latter about one-third the distance from the apex to the second recurrent vein.

Legs light ferruginous, inner tibial spur distinctly stouter and longer; claws black, pectinate.

Abdomen of general color, strongly compressed, venter and apical segments slightly tinged with fuscous.

In redescribing this species I have examined the two co-types.

Cotypes, two ♀'s, New York State Museum.

I am not fully satisfied of the validity of this species; it is related to *O. bifoveolatus* and its subspecies.

Distribution.—Colorado.

***Ophion chilensis* Spin.**

<i>Ophion chilensis</i> Spinola, Gay Hist. fis. y. polit. de Chile, VI, p.	
515, n. 1, ♀	1851.
“ “ Dalla Torre, Cat. Hym., III, p. 188.....	1901.
“ “ Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 31, n.	
92.....	1905.

Glaucous to light straw yellow, marked with ferruginous or black; vertex glaucous or luteous, antennæ fulvous, discocubital vein usually appendiculate, nervulus antefurcal to interstitial, nervellus broken at or near the middle.

Length, 12–18 mm.; wing, 12–15 mm.; spread, 26–32 mm.; antennæ, 12–18 mm.

Head luteous to alboglaucous, face sometimes tinged with ferruginous, vertex luteoglaucous; ocelli prominent, well separated; eyes medium sized, only slightly emarginate; clypeal foveæ distinct.

Thorax glaucous, mesonotum with three longitudinal ferruginous or black stripes, parapsidal furrows distinct only at the anterior border; mesosternum and metasternum ferruginous or dark gray, pleuræ of the general color, frequently marked with ferruginous, scutellum often flavous; metathorax more or less marked with fuscous or ferruginous, often in the shape of two clearly defined ferruginous spots at the base; with two transverse, two submedian and two lateral carinæ.

Wings hyaline, iridescent; stigma luteoglaucous, frequently marked with fuscous; costa light glaucous, with the lower edge black, nervures otherwise black; discocubital vein usually angularly broken and appendiculate, sometimes arcuate without appendix—first recurrent vein about one-third the length of the second; nervulus antefurcal to interstitial, nervellus broken at or near the middle.

Legs fulvous, coxæ frequently more or less glaucous, claws pectinate; abdomen with first segment glaucous or fulvous, the remainder varied with ferruginous or black, or entirely fuscous.

In redescribing this species I have examined twenty-five ♀ and one ♂ specimens.

Type.—♀. Location unknown to the author.

As Spinola notes in his description this species varies considerably in color in both directions, from a form with the body, except legs and antennæ, entirely glaucous to one that is straw-yellow with distinct ferruginous markings; between these two are various combinations of yellow and glaucous with more or less distinct ferruginous markings. The discocubital vein is normally angularly broken and appendiculate, but a good series shows at once that it is frequently, as in *bifoveolatus*, only angularly bent, or arcuate, and without appendix.

Distribution.—This species was described by Spinola from Chili, and I have before me numerous specimens from Largo Blanco Valle, Chubut Territory, Patagonia, Argentina.

Location of specimens.—U. S. National Museum, ♀ and ♂ from Argentina (Largo Blanco Valle, Chubut Territory, Patagonia). Massachusetts Agricultural College, ♀, Argentina. British Museum.

***Ophion ancyloneura* Cam.**

Ophion ancyloneura Cameron, Biol. Centr. Amer., Hym., I, p.

294, n. 13, ♀, pl. 12, fig. 17.....1886.

" *ancyloneurus* Dalla Torre, Cat. Hym., III, p. 188.....1901.

" " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
31, n. 89.....1905.

Sulphur-yellow, antennæ, abdomen and tibiæ luteous, wings hyaline, stigma testaceous.

Length, 17 mm.

Antennæ a little longer than the body, pilose, third joint shorter than the fourth and fifth together; head closely punctured; clypeal foveæ large, deep, longer than broad, face broadly projecting in the middle; with a longish tubercle below the antennæ; tips of the mandibles piceous black. Thorax almost impunctate, shining; mesonotum with three obscure fuscous stripes, the sutures very shallow; metanotum with two distinct, transverse keels, united in the centre by two longitudinal ones, which form a longish area; from the apical transverse keel run some not very clearly defined keels to the apex, (except the central pair which form an area, narrower towards the apex in front of the above mentioned area between the two transverse keels);

petiole inclining to yellow, indistinctly keeled; post-petiole thicker than and clearly defined from the petiole, luteous, finely and closely punctured; the other segments are densely pilose, the apical one more darkly clouded. Wings hyaline, stigma testaceous, discocubital vein angularly broken and strongly appendiculate, nervulus antefurcal to interstitial.

I have not seen the type or a specimen of this species, and can only give the original description slightly rearranged.

Type.—Location unknown.*

Cameron adds: "Smaller than *O. flavo-orbitalis*; the head and thorax almost entirely yellow, the third joint of the antennæ longer, the first abdominal segment longer and narrower. The post petiole longer in proportion to the petiole: the second segment contracted before the middle (in addition to the contraction at the base), the third discoidal cellule distinctly angled in the middle, the projecting branch reaching just half way across."

I am not sure of the validity of this species, but it is closely related to *O. bilineatus*.

Distribution.—Guatemala, Capetillo.

***Ophion bilineatus* Say.**

<i>Ophion bilineatus</i>	Say, Contr. Maclur. Lyc. Arts Sci., p. 75, n. 1.	1828.
" "	" Boston Journ. Nat. Hist., I, p. 240, n. 4.	1835.
" "	" Compl. Wr. La Conte ed., I, p. 378, n. 1;	
	II, p. 695, n. 4 (reprints, 1883, 1891).	1859.
" "	Cresson, Proc. Ent. Soc. Phila., I, 206, Ind.	1862.
" "	Norton, Proc. Ent. Soc. Phila., I, 358	1863.
" "	Sanborn, Mass. State Bd. Agr., Tenth Rept.,	
	p. 169	1863.
" "	Riley, Third Ann. Rept. Ins. Missouri, p. 69.	1871.
" "	Cresson, Trans. Amer. Ent. Soc., IV, p. 169.	1873.
" "	" Geog. Sur. Ter. Rept. Zool., 5, p.	
	706, Eastern Nevada	1875.
" "	Provancher, Nat. Can., XXI, pp. 117-118, fig. 4.	1879.
" "	Packard, Bost. Soc. Nat. Hist. Proc., 21, p. 19.	1882.
" <i>tityri</i>	" Idem	1882.
" <i>bilineatus</i>	Saunders, Ins. Inj. to Fruits, p. 273, ♀ fig. 282	
	(second ed., 1889, third ed., 1909)	1883.
" "	Provancher, Faun. Ent. Can., II, Hym., p.	
	351, n. 3, fig. 36, a, ♀ ♂	1883.

* Not in the British Museum; it may have been deposited elsewhere or retained by Cameron.

<i>Ophion bilineatus</i>	Lintner, Fourth Rept. Ins. N. Y., p. 205.....	1888.
“ “	Howard, Scudder's Butterflies of Eastern U. S. (New Eng.), p. 1880, pl. 88, fig. 8.....	1889.
“ <i>tityri</i> Idem		1890.
“ <i>bilineatus</i>	Riley and Howard, Insect Life, III, p. 155, list of hosts	1890.
“ “	Ashmead, Colo. Biol. Assn. Bull., I, p. 43, Colo.	1890.
“ “	Perkins, Vt. State Bd. Agr., Eleventh Rept., Sept., p. 18.....	1890.
“ <i>bilineatum</i>	Ashmead, Smith. Cat. Ins. N. J., p. 15 (second ed., p. 580, 1899).....	1890.
“ “	Harrington, Ent. Soc. Ont., Twenty-first Rept., p. 67	1891.
“ “	Osborn, Partial Cat. Animals Ia., p. 115.....	1892.
“ “	Evans, Can. Ent., 28, p. 10.....	1896.
“ “	Howard, U. S. Dept. Agr., Div. Ent., Bull. 5, Tech. Ser., p. 30.....	1897.
“ “	Dalla Torre, Cat. Hym., III, p. 188, Am. bor.	1901.
“ <i>tityri</i> Idem	p. 198.....	1901.
“ <i>bilineatum</i>	Ashmead, Proc. Wash. Acad. Sci., IV, p. 233, Sitka, Alaska, two ♀'s, June 16	1902.
“ “	Felt, N. Y. State Mus., Bull. 76, p. 114, pl 2, fig. 3.....	1904.
“ <i>tityri</i> Idem	p. 116.....	1904.
“ <i>bilineatum</i>	Ashmead, Hym. of Alaska, p. 239, two ♀'s, Sitka, Alaska, June 16	1904.
“ “	Howard, Insect Book, pp. 60½, pl. 10, n. 17.....	1905.
“ “	Viereck, Trans. Kansas Acad. Sci., XIX, p. 313, taken at 3350 feet	1905.
“ <i>idoneum</i> Idem.		
“ <i>bilineatus</i>	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 32, n. 114.....	1905.
“ <i>tityri</i> Szepligeti, Idem	p. 32, n. 122	1905.
“ <i>bilineatus</i>	Hitchings, Third Rept. Maine State Ent., p. 12.....	1908.
“ <i>tityri</i>	Chittenden and Russell, U. S. Dept. Agr., Bur. Ent., Bull. 66, Part V, p. 63	1909.
“ “	Viereck, Smith's Ins. N. J., third ed., p. 621	1910.
“ <i>bilineatus</i>	Viereck, Idem	1910.
“ <i>latilineatus</i>	Cameron, Journ. Royal Agr. and Commer. Soc. Brit. Guiana, p. 179.....	1911.

Fulvo-ferruginous, varying from flavous to ferruginous; eyes large, extending nearly to the base of the mandibles, abdomen usually strongly compressed, stigma well developed, discocubital vein appendiculate, size variable.

Length, 10-20 mm. ; wing, 9-18 mm. ; spread, 20-38 mm. ; antennæ, 14-22 mm.

Fulvo-ferruginous, varying from flavous to ferruginous, the light specimens usually with dark ferruginous markings.

Head with dorsal and posterior aspects yellowish, frequently with irregular narrow bands of yellow surrounding the eyes and writing behind the ocelli ; antennæ as long or longer than the body ; ocelli large, well separated, the posterior a little distant from the tops of the eyes ; eyes large, emarginate ; clypeal foveæ distinct ; mandibles bidentate, tipped with black.

Thorax slightly lighter colored than the rest of the body ; mesonotum with three longitudinal ferruginous stripes more or less distinct ; metathorax with inconstant carinæ, or smooth and finely punctured ; two transverse and six longitudinal carinæ are frequently evident, but are often more or less indistinct and sometimes entirely wanting.

Wings hyaline, often slightly tinged with fuscous ; iridescent, stigma and most of the costa flavous,* nervures otherwise black ; discocubital vein angularly broken and appendiculate, the appendix varying considerably in length ; nervulus antefurcal to interstitial, nervellus broken at or near the middle, a small glabrous spot in the discocubital cell near the stigma ; legs of the general color, claws pectinate ; abdomen generally strongly compressed, often darker at the apex, varying somewhat in shape, slender or quite broad.

In describing this species I have examined over 500 specimens from all parts of North America, the West Indies, and some from South America.

Type.—Lost.

This species shows a wide variation in color, and light and dark specimens are common ; Say's type must have been one of the light forms, many of which are more or less distinctly marked with longitudinal ferruginous stripes on the mesonotum. Sometimes the stripes are lacking even in the lighter forms, while in the dark forms the whole thorax is ferruginous, and the mesonotal stripes are consequently obliterated. Between these two light and dark forms are all sorts of gradations. The wings are normally hyaline but are often tinged with fuscous ; the length of the appendix of the discocubital vein varies from almost rudimentary to long ; the areolation of the metathorax varies considerably, it being sometimes smooth, without carinæ, and sometimes strongly

* The stigma is sometimes marked with ferruginous or black.

areolated as described, but more frequently an intermediate condition exists where the carinæ are present but more or less indistinct. In all parts of the range of this species there are a few small specimens; these seem to be especially numerous in Colorado, and might at first be looked upon as a separate species or subspecies, but since they agree with the larger specimens in structure and color, and show the same variations, I do not see how they can be considered even a subspecies. *O. tityri* Pack. was at first proposed as a variety of this species, and later raised to specific rank, the differences given being that *tityri* is "smaller, with the abdomen considerably shorter, the metathorax strongly areolated, and the male clasps subtriangular, obtusely rounded; while in *bilineatus* the metathorax is smooth, and the male clasps are subtriangular, obliquely truncate and acute posteriorly." After a careful examination of a large series, however, I find that none of these characteristics are constant. I have worked upon these for some time, and do not believe *tityri* can be given even subspecific rank. Occasionally characteristic *tityri* specimens will be found, but there is a complete gradation from these to the typical *bilineatus*, and these intermediate specimens are by far the most abundant. Dr. Felt states that *tityri* "has a well-defined period of flight, which does not overlap the time *O. bilineatus* is abroad, except in the case of scattering individuals. This species appears early in May, is most abundant till the latter part of the month and occasionally in July, with belated individuals to October, while *O. bilineatus* does not occur till August, and then only in scattering numbers till the latter part of the month. This marked difference in the time of flight between these two parasites indicates either that they represent two broods of the same insect or else they are distinct species." Specimens before me, however, show that characteristic *bilineatus* are taken quite as frequently early in the summer, and I have taken them at Amherst, Mass., as early as April 15. Many of the more slender specimens closely resemble *O. luteus*, and some writers have considered the South American forms as such, believing it to be introduced. After examining

such specimens and comparing them with authentic specimens of *luteus* from Europe I find little difference, and *bilineatus* may prove to be a synonym or subspecies of *luteus*. However, until a good series of both can be compared the two species should be preserved.

Distribution.—This species has a wide distribution from Alaska and southern Canada to Patagonia, Argentina, including the West Indies. In North America it has been taken on the north at Sitka, Alaska; Lake Winnipeg; Sudbury, Ontario; and Grand Lake, Newfoundland. In the United States it has been taken in nearly every State from Maine, Ohio, Montana and Washington, to Florida, Texas and California. I have also seen specimens from Mexico; British Honduras; Porto Rico; Santo Domingo; Jamaica; Bonito Province, Pernambuco, Brazil; Chili; Tapis and Chubut, Patagonia, Argentina.

Life history and habits.—This species is, next to the long-tailed and purged Ophions, the most common in collections and the one most frequently noted in entomological literature. Yet very little is recorded concerning the life history and habits of the species. Adults have been taken in Massachusetts from April 15 to the last of October, but appear to be most abundant from the middle of May to the first of September. The Cornell experiments with trap-lanterns seem to show that there are two broods, one the last of May and one in August, with only scattering specimens during the intervening months. But as much of the museum material is without date of capture I am unable to decide this question. Toward the south adults will probably appear earlier and later, and I have before me specimens from Bonito Province, Brazil, taken January 31, February 4 and August 1, and from Santo Domingo, West Indies, in September. The large eyes indicate crepuscular or nocturnal habits, and experiments show that it is one of the most abundant forms attracted to light. The females are, as might be expected, more abundant in collections owing to their activity in searching out suitable hosts for their eggs. The

Cornell lantern records show that eighty-seven males were to taken four and five females. This species does not appear always to spin a cocoon, due probably to the conditions obtaining; if the larva can pupate within the cocoon of its host no cocoon of its own is necessary, but if the host dies before it can spin up, the larva of the parasite evidently spins a cocoon. This is compressed oval, 15-16 mm. long and 5-8 mm. wide, composed of dull, dirt-colored silk, sometimes darker at the ends and thus forming a more or less distinct median band.

Economic importance.—Very little is known of the hosts of this species, and hence its value as a parasite can not be determined, but its abundance and wide distribution indicate that it is important. The brief records available show that it preys on some of the Arctians and Noctuidæ; the former are not of much economic importance, but the latter are, and this species may accordingly prove to be of considerable value.

The following hosts have been recorded, or specimens are before me:

- Diacrisia (Spilosoma) virginica* Fabr., Felt, N. Y. State Mus.,
Bull. 76, p. 1151904.
- Epargyrus tityrus* Fabr., Idem.
- Feltia gladiaria (morrisoniana)* Morrison; Riley and Howard,
Ins. Life, III, p. 155.....1890.
- Glæa inulta*, Grote, Idem.
- Halisidota caryæ* Harris; Felt, N. Y. State Mus., Bull. 76, p.
1181904.
- ? *Notolophus leucostigma* Abb. and Smith; Howard, U. S. Dept.
Agr., Div. Ent., Tech. Ser., Bull. 5,
p. 301897.
- Prodenia eridania* Cram.
- Samia cecropia* L.
- Symmerista albifrons* Abb. and Sm.; Felt, N. Y. State Mus., Bull.
76, p. 118.....1904.
- Telea polyphemus* Cram., July 17-Aug. 1.

Location of specimens.—The U. S. National Museum collection contains specimens from Sitka, Alaska; British Columbia, Washington, California, Wyoming, Montana, Colorado, Michigan, Kansas, Arkansas, Indiana, Ohio, Pennsylvania, New York, Connecticut, New Hampshire, Delaware and Virginia.

Ophion biangularis Tasch.

- Ophion biangularis* Tasch., Zeitschr. ges. Nat., Vol. XLVI, p. 432,
 Lagoa Santa, Brazil, ♀1875.
 " " Dalla Torre, Cat. Hym., III, p. 188, listed.....1901.
 " " Szepilgeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31,
 n. 91, listed.....1806.

Testaceous with head much paler, apex of abdomen infuscated; melanotum areolated. Wings hyaline, stigma fuscous, base of wings and squamula testaceous.

Length, 16 mm.

Weakly pubescent. The metanotum is divided by two ridges into three equal stripes; through the middle and hind areas goes, divided by two longitudinal ridges, a somewhat wedge-shaped, narrow, longitudinal area. On the clear wings the insipid yellow stigma and background stand out sharply against the dark veins. The hind border of the large cell is broken in the middle nearly at right angles and furnished with a nerve branch, then in the middle of its outer part nearly broken again by a very blunt angle. The inner part of the radius is straight.

I have seen only one specimen of this species.

Type.—♀. Location unknown.

Distribution.—Lagoa Santa, Brazil; Cordoba, Mexico; one ♂ U. S. National Museum, Cordoba, Vera Cruz, Mexico (March 26, 1908).

Ophion abnormis Felt.

- Ophion abnormum* Felt, N. Y. State Mus., Bull. 76 (nineteenth
 Reprt. State Ent.), p. 121, pl. 2, n. 5.....1904.
Eremotylus felti Viereck, Kans. Acad. Sci., XIX, p. 264.....1905.

Flavofulvous varied with ferruginous; head large, face broad; eyes small, distant from base of mandibles; discocubital vein with more or less distinct appendix; sometimes with an abnormal stub of a vein extending back into the third discoidal cell.

Length, 13–18 mm.; wing, 12–15 mm.; spread, 26–32 mm.; antennæ, 12–17 mm.

Head flavous tinged with fulvous, large, broad; eyes small, narrow, only slightly emarginate, distant from the base of the mandibles; ocelli large, prominent, well separated, distant from the tops of the eyes; antennæ fulvous, short, not quite as long as the body; face broad, clypeal foveæ deep; mandibles strong, bidentate, tipped with black; thorax flavofulvous marked with ferruginous; mesonotum with three longitudinal ferruginous stripes; parapsidal furrows distinct only in front; scutellum small, rounded, often flavous; pleuræ more or less

and pectus generally ferruginous; metathorax shining, smooth and finely punctured, with indistinct carinæ.

Wings hyaline or slightly tinged with fuscous; stigma light to dark flavous; nervures black; discocubital vein angularly bent without an appendix, or angularly broken with a more or less distinct appendix; rarely with an abnormal stub of a vein extending back into the third discoidal cell; nervulus interstitial to postfurcal, nervellus broken at or above the middle.

Legs fulvous; claws pectinate.

Abdomen fulvous, sometimes marked with fuscous, especially along the venter; usually strongly compressed.

Redescribed from type ♀ and eight ♂ specimens.

Type.—♀. New York State Museum.

This species is closely related to *O. bifoveolatus*, but may be recognized by the larger, usually flavous head, which is generally fulvous in *bifoveolatus*—the usually more strongly compressed abdomen and smaller size. In the type there is a stub of a vein projecting into the third discoidal cell from the lower half of the discocubital vein, but this is apparently abnormal, for there was never any recognized vein at this place, and a homotype in the collection of the American Entomological Society shows this abnormality in only one wing and located slightly lower down. The appendix and discocubital vein vary as in *bifoveolatus*.

After carefully examining one of Viereck's paratypes of *Eremotylus felti* Vier., in the American Entomological Society collection I find that it belongs in the Genus *Ophion*, and after comparing it with specimens of *O. abnormis* I believe that it is a synonym. In the paratype of *E. felti* the base of the radial vein is slender and straight, not thickened and bent as in *Eremotylus*; the discocubital vein is bent as in many specimens of *O. bifoveolatus*, and the third discoidal cell is short and high—not long and slender as in *Eremotylus*. A series of specimens shows that the discocubital vein varies, as in *bifoveolatus*, from angularly bent and without appendix to angularly broken and more or less strongly appendiculate.

Distribution.—Washington, Montana, California, Colorado, Kansas.

This species seems to have a limited range through the west-

ern United States following the Rocky Mountains and Coast Range. The type was taken in Colorado, and Viereck's specimens came from Denver, Colo., and Hamilton County, Kansas, at 3,350 feet. I have before me specimens from Cheney, etc., Wash.; Palo Alto, Cal., March 25; Missoula, Mont., May 18; and several specimens from Colorado.

Nothing is known of the life history, habits, or hosts, but these probably differ little from those of *bifoveolatus*. The small eyes indicate that it may be diurnal.

Location of specimens.—New York State Museum, ♀ type. American Entomological Society, homotype, ♂, Colorado; ♀, Paratype of *E. felti* Vier., Denver, Colo.; three ♂'s, southern California. Washington, U. S. National Museum, two ♂'s, Cheney, Wash., and Riley, Colo. Kansas University, ♀ (type of *E. felti* Vier.), 3,350 feet, Hamilton County, Kans. Montana Agricultural College, ♂, Missoula, Mont., May 18. Leland Stanford, Jr., University, Palo Alto, Cal., March, 25.

***Ophion flavoorbitalis* Cam.**

<i>Ophion flavoorbitalis</i>	Cameron, Biol. Centr. Amer., Hym., I, p.	
	294, pl. 12, fig. 16.....	1886.
" "	Dalla Torre, Cat. Hym., III, p. 191.....	1901.
" "	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p.	
	31, n. 101.....	1905.

Luteous, eyes and scutellum flavous, wings hyaline, stigma luteous.

Length, 21–22 mm.

Face broadly projecting, finely punctured; thorax finely punctured, scutellum with the side carinate; metanotum aciculate, with two short transverse keels, the space between them hollowed; a longitudinal keel on either side of these, and a posterior transverse one forming a longish area; wings hyaline, stigma luteous, discocubital vein angularly broken and appendiculate, its outer half parallel with the basal half of the radial vein.

First abdominal segment dilated at the apex, the dilation gradual from the middle; the sides keeled; second segment thicker and distinctly shorter than the first.

I have not seen the type or a specimen of this species and can only give the original description, slightly modified.

Type.—♀. British Museum.

I am not sure of the validity of this species, and it may

yet prove to be a synonym of *O. bilineatus*; it may apparently be recognized by its lighter color and broadly projecting face. The third discoidal cell is, judging from the figure, fully as wide as long.

Distribution.—Mexico (Cordova), Panama (Volcan de Chiriqui, 2,500 to 4,000 feet.

***Ophion chiriquensis* Cam.**

<i>Ophion chiriquensis</i>	Cameron, Biol. Centr. Amer., Hym., p. 294, n. 11, pl. 12, fig. 20.....	1886.
“ “	Dalla Torre, Cat. Hym., III, p. 188	1901.
“ “	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 31, n. 93	1905.

Luteous, head, scutellum and pleura flavous, wings hyaline, stigma luteous.

Length, 23 mm.

Head shining, obscurely punctured; antennæ luteous, as long as or longer than the body; clypeal foveæ deep, longish.

Thorax covered with close pale pubescence; mesonotum very minutely punctured, the pleura finely, longitudinally striated. Scutellum carinate along the sides. Metanotum with one transverse keel near the base, the base behind it finely rugose, the rest of the surface finely rugose and bearing arcuate keels; metapleuræ finely rugose; petiole shining, glabrous, slightly hollowed in the center above the base; second segment stouter and not so much compressed laterally as the petiole, densely covered with a white pubescence. Wings hyaline, stigma luteous, basal division of the radius not curved upward, third discoidal cell more than three times as long as wide, nervulus antefurcal.

I have not seen a specimen of this species, and can only give the original description slightly rearranged.

Type.—♀. British Museum.

Cameron states that it is “smaller than *O. curvinervis* and identical with it in structure (including the form of the metathorax) and in coloration, except that the antennæ are entirely luteous; differing from it otherwise in its smaller size, in the second abdominal segment being stouter and not so much compressed laterally compared to the first; in the basal division of the radial nervure not being curved upwards, and in the upper angles of the apex of the first cubital cellule being longer than the lower.”

Distribution.—Panama, Volcan de Chiriqui, 2,000 to 3,000 feet.

Genus **RETANISIA** Cam.

- Retanisia* Cameron, Biol. Centr. Amer., Hym., I, p. 299.....1886.
 " Ashmead, Proc. U. S. Nat. Mus., No. 1206, pp. 87,
 184 (Vol. XXIII, 1900).....1900.
 " Dalla Torre, Cat. Hym., III, p. 179.....1901.
 " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., pp. 36-37.....1905.

Parapsidal furrows deep; claws not pectinate; abdomen not much longer than the head and thorax together, gradually dilated to the fifth segment; discocubital cell receiving both recurrent veins; median tibiæ with two apical spurs; antennæ long, filiform.

Generic type *R. facialis* Cam. (monotypical).

Cameron characterizes the genus as follows:

"Head as broad as the mesonotum, about one-half broader than long. Clypeus almost transverse at the apex, but with the sides rounded; labrum small, rounded. Eyes not incised on the inner side. Parapsidal furrows deep and wide, reaching nearly to the scutellar fovea, which is wide and deep. Scutellum longer than broad, not much elevated, narrowed toward the apex, which is rounded; the sides are keeled. Metathorax gradually sloping to the apex, longish, with more or less distinct areæ. Abdomen not very much longer than the head and thorax united, becoming gradually dilated to the fifth segment. Hind legs very long; the coxæ longer than the trochanters, the tibiæ nearly as long as the coxæ, trochanters and femora united; the tarsi a little shorter than the tibiæ; the hind tibiæ having two short thick spurs, the anterior pair a longer and more curved one. The matatarsus is scarcely twice the length of the next joint, and the basal joint of the anterior tarsi is curved at the base. In this genus the cubital cell receives both the recurrent nervures, and therefore agrees with *Thyreodon*, *Ophion*, *Nototrachys*, *Ophiopterus* and *Agathophiona*. From *Thyreodon* it may be known by the abdomen not being strongly compressed laterally, the much longer legs and antennæ, the eyes entire and the claws not pectinated; from *Nototrachys* by the long antennæ and the shining mesonotum; from *Ophion* by the abdomen not being compressed, the eyes entire, and the now pectinated claws; from *Ophiopterus* by the very long antennæ and legs, and the dilated abdomen; and from *Agathophiona* by the normal length of the labium, the long antennæ, the much longer legs, and the much shorter, more dilated and thickened abdomen; and from all five by the very deep parapsidal furrows. The antennæ in the male—the only sex known—are longer than the body; the joints contracted in the middle, dilated at the base and apex; the third joint about one-fourth longer than the succeeding ones; towards the apex the joints become very slightly narrowed."

Judging from Cameron's plate the nervulus is interstitial and the nervellus broken at the middle, the discocubital vein arcuate, not appendiculate. I am not sure of the validity of this genus, for the short stout abdomen of the male—the sex of the single specimen known—indicates that the female when discovered may have a long ovipositor or other characters which might place it in some other genus. As I have not seen a specimen, however, I have preserved the genus, but further investigation is necessary.

Distribution.—Guatemala (Purula).

Nothing is known of the life history, habits or hosts.

Retanisia facialis Cam.

- Retanisia facialis* Cameron, Biol. Centr. Amer., Hym., I, p. 299,
n. 1, ♂, pl. 12, fig. 7.....1886.
“ “ Dalla Torre, Cat. Hym., III, p. 179.....1901.
“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 37.1905.

Black, scape of antennæ beneath, face, mouth, eyes, anterior feet in part and apex of posterior tarsi flavous; wings hyaline, apex smoky, nervures black, ♂.

Length 15 mm. (about).

Head strongly punctured; a triangular projection below the antennæ, its centre almost carinated, the face transversely striated on either side of it; below the antennæ, the orbits broadly behind, the palpi, clypeus (except at the extreme apex), and the labrum yellow. Thorax strongly punctured, shining, the scutellum scarcely so strongly punctured as the mesonotum; metanotum with seven areæ; the sides more or less reticulated. Abdomen shining, impunctate, the ventral surface in the middle obscure yellow. The anterior legs in front and the tarsi are entirely yellow; the middle pair have the coxæ, the greater part of the trochanters, the femora—except the base—and the apices of the tarsi, yellow; the four apical joints of the hind tarsi are also yellow. The head and thorax are covered with a close fuscous pile.

Distribution.—Guatemala (Purula).

Nothing is known of the life history, habits or hosts.

Genus **ENICOSPILUS** Steph.

- Enicospilus* Stephens, Cat. Brit. Ins., p. 352 (nomen nudum).....1829.
“ “ Illustr. Brit. Ent. Mand., VII, p. 126, pl.
40, fig. 4.....1835.
“ Westwood, Brit. Ent., I, Appendix, p. 60.....1840.
“ Stephens, Illustr. Brit. Ent. Mand., VII, p. 311.....1845.
“ “ Idem, Suppl., p. 3.....1846.
“ “ Kirchner, Cat. Hym. Europ., p. 99.....1867.

- Allocamptus* Förster, Verh. Nat. preuss. Rheinl., 25, p. 150 (Nec Thomson).....1868.
Henicospilus Bridgman and Fitch, The Entomologist, 17, p. 176..1884.
Dispilus Kriechbaumer, Berl. Ent. Zeitschr., 39, p. 309.....1894.
Enicospilus Ashmead, Proc. U. S. Nat. Mus., No. 1206, pp. 87, 170 (Vol. XXIII).....1900.
 “ “ Trans. Ent. Soc. Lond., pp. 270, 354.....1900.
Trispilus Kriechbaumer, Zeitschr. Syst. Hym. Dipt., I, p. 156 ...1901.
Pterospilus Kriechbaumer, Idem.....1901.
Henicospilus Dalla Torre, Cat. Hym., III, p. 180.....1901.
Enicospilus Felt, N. Y. State Mus., Bull. 76, pp. 101, 107 (ninetenth Rept. State Ent.)1903.
Henicospilus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 25, n. 7..1905.
 “ Schulz, Spolia Hym., p. 277.....1906.
Enicospilus Schmiedeknecht, Opusc. Ichn., 18, p. 1428, n. 4.....1908

Anterior wings without areolet; discocubital vein not angularly broken but straight or bent, not appendiculate; transverse-cubital vein straight, discocubital with one or more chitinous maculæ in a glabrous area; face unarmed, clypeus truncate. Ocelli large, claws long and pectinate.

Generic type.—*E. merdarius* Grav.

The chief generic characters of this genus lie in the wings and the members resemble representatives of the Genus *Eremotylus* in many respects. The venation is similar in the characteristic shape of the radial and discocubital veins, the only important difference being in the presence of maculæ in *Enicospilus*. Just how constant these are can not be determined from data now available, but it is evident that the size and shape of a macula often varies somewhat and may be entirely lacking. This occurs in such species as *purgatus* and *thoracicus*, and it is certainly possible that it may occur in such species as *flavus* and *flavo-scutellatus*. If the single macula in the last should be entirely lacking a specimen would be readily classed in the Genus *Eremotylus*. Numerous records indicate and study of a good series of specimens quickly shows, that the shape and size of the maculæ vary considerably within a species, and that apparently little weight can be placed upon these characters. Just how great this variation is can not be determined until extensive breeding experiments have been carried on.

The Genus *Enicospilus* was first proposed by Stephens in his Catalogue of British Insects, p. 352, 1829—with a single species, *E. simulator*; no description of *E. simulator* can be found and it evidently never passed the manuscript stage. Both genus and species, being new and without descriptions, stand as nomina nuda. In 1835 the Genus *Enicospilus* was again proposed in Stephens' Illustrations of British Entomology, Mandibulata, VII, September 30, p. 126, and this time it was characterized in a table. A colored figure, by Westwood, was given on a plate stamped "Published Sept. 30, 1835," but it seems to have been published in the part* dated October 31, 1835, and so far as I can learn no name or description was given to this figure till the part published November, 1845,† when it was given in the list of plates as *Enicospilus merdarius* Grav.‡

This was a well-known species of *Ophion* described in 1829⁴ and as a species is thus designated, the genus *Enicospilus* Stephens must stand as established in November, 1845, with *Enicospilus merdarius* Grav. as type. It is evident that the figure—Pl. 40, fig. 4—is not *merdarius*, and Stephens recognized his mistake when he published the description—Suppl., Aug., 1846—of *E. merdarius*, *ramidulus* and *combustus*, and stated that the figure is *E. combustus* Grav. The figure differs markedly from the description of *E. merdarius* but agrees with that of *E. combustus*, and must stand as such. This fact does not, however, affect the validity of *E. merdarius* Grav. as generic type. Ashmead for some reason unknown to me credits this genus to Curtis.

Orthography.—Considerable confusion has arisen over the orthography of the generic name, and it has been spelled *Enicospilus*, *Henicospilus* and *Eniscopilus*. This confusion is partly due to the derivation of the name—from ^ενικός, unicus; σπιλος, macula. Stephens spelled the name *Enicospilus*, but apparently overlooked the aspirate ^ε which would make the

* Stephens' Illustr. Brit. Ent. was published serially.

† Westwood states, Brit. Ent., I, Appendix, p. 60, in 1840, that this figure, plate 40, fig. 4, is evidently intended for a species of the Genus *Enicospilus*, of which the species is not indicated.

‡ Gravenhorst, Ichn. Europ., III, p. 698, n. 138, ♀ ♂, 1829.

derivative *Henicospilus*. Some later writers have tried to remedy his seeming mistake by adding the *H*, hence the confusion. According to the International Code of Nomenclature—Art. 19—"The original orthography of a name is to be preserved unless an *error of transcription*, a *lapsus calami*, or a *typographical error* is evident." In this case an error of *transliteration* is evident, not an error of transcription. Both a *lapsus calami* and a *typographical error* are excluded, for Stephens wrote *Enicospilus* consistently in several places and at different times, namely, in his Catalogue of British Insects, p. 352, 1829, in his Illustrations of British Entomology, Mandibulata, VII, p. 126, September, 1835; List of Plates, November, 1845, and in the Supplement, p. 3, August, 1846.

The question rests, therefore, upon the interpretation of the word transcription, and I do not believe it can be made to include transliteration.* The latter corrections can not, therefore, be accepted, and the generic name stands as *Enicospilus* Stephens, established November, 1845; type *Enicospilus merdarius* Grav.

Distribution.—Most members of this genus are tropical or subtropical, but a few range into the Boreal Zone, representatives of the genus having been taken from Alaska and Newfoundland in North America to Buenos Ayres in South America, including the West Indies.

Enicospilus purgatus has a remarkable distribution, specimens before me showing that it ranges from Fox Point, Alaska,† and Grand Lake, Newfoundland, south into Mexico, the West Indies and Chili. No other member of the genus is known to be so widely distributed. Among the tropical forms *monticola* has been taken 3,000 feet above sea level and *flavoscutellatus* at 4,500–7,000 feet, but whether these species are local or have followed the mountain ranges is not yet determined.

* For further discussion of emendation of names, see U. S. Dept. Agr., Bur. Animal Ind., Bull. 79, pp. 75–76, 1905.

† "An Indian village at the extreme southeastern corner of the Alaska mainland."

Economic importance.—Not much is known of the life histories of the tropical species, but the northern members are recognized as beneficial parasites. Records indicate that *E. purgatus* is one of the most valuable members of the tribe since it preys upon several injurious insects of considerable importance. It has been frequently noticed as a parasite of the destructive army worm, *Heliophila unipuncta* Haw., on which it "serves as a very efficient check." Professor Luggar's report of 1896 gives the best evidence of its value as a parasite. I have before me one specimen bred from the cotton worm (*Aletia*) *Alabama argillacea*, but can find no record of this host, and can not say whether or not it is frequently attacked. It has also been reared from the zebra caterpillar, *Mamestra picta* Haw., another injurious species, and preys upon several of less importance.

Life history and habits.—Little is known of the life history or habits of the members of this genus aside from those of *E. purgatus*, but so far as known they do not differ from those of other members of the tribe.

TABLE OF SPECIES.

1. Antennæ black or dark fuscous.....2.
 Antennæ flavous or fulvoferruginous.....9.
2. Abdomen entirely black beyond the first segment.....3.
 Abdomen not entirely black beyond the first segment.....4.
3. Larger macula appendiculate.
 fuscipennis flavostigma n. subsp.
 Larger macula not appendiculate.....*fuscipennis* Szep.
4. Wings fulvo-hyaline.....*bicolor* Tasch.
 Wings hyaline.....5.
5. Head with distinct longish tubercle below the antennæ.
 fuscicornis Cam.
 Head without distinct longish tubercle below the antennæ6.
6. Discocubital cell with one macula.....7.
 Discocubital cell with two maculae.....8.
7. Discocubital cell with a linear, arcuate macula...*nigricornis* Br.
 Discocubital cell with a triangular macula.....*ressoni* n. sp.
8. Abdomen beyond the fourth segment black.....*fernaldi* n. sp.
 Abdomen with segments 3 to 8 black*monticola* Cam.
9. Discocubital cell with only one macula or a macula and one or more lines.....10.
 Discocubital cell with more than one macula19.

10. Vertex yellow.....11.
Vertex black.....16.
11. Apex of abdomen black.....12.
Apex of abdomen not black.....13.
12. Discocubital cell with one macula.....**nigricauda** Tasch.
Discocubital cell with one macula and two lines.
thoracicus Cress.
13. Stigma red.....**flavoscutellatus** Br.
Stigma yellow.....14.
14. Discocubital cell with one macula and two lines..**thoracicus** Cr.
Discocubital cell with one macula.....15.
15. Stigma pale flavous.....**guatemalensis** Cam.
Stigma fulvous.....**neotropicus** n. sp.
16. Abdomen entirely red.....**brulléi**.
Abdomen not entirely red.....17.
17. Abdomen with three basal segments red, the rest yellow.
trilineatus Br.
Abdomen with three basal segments yellow.....18.
18. Larger macula with outer end sharply pointed.....**flavus** Fabr.
Larger macula with outer end rounded.....**concolor** Cress.
19. Larger macula appendiculate.....20.
Larger macula not appendiculate.....22.
20. Discocubital cell with two maculae, the larger with a long appendix
extending below the smaller.....**purgatus arcuatus** Felt.
Larger macula with only a short appendix.....21.
21. Sternum and stigma (except base and apex) black.
maculipennis Cress.
Sternum and stigma yellow.....23.
22. Face with distinct median tubercle between the antennal fossae.
sphacelatus Erich.
Face without distinct median tubercle between the antennal
fossae.....26.
23. Discocubital cell with two maculae and often a line—the detached
appendix of the larger macula—under the smaller.
purgatus Say.
Discocubital cell with only two maculae.....24.
24. Outer macula erect crescentic.....25.
Outer macula not erect crescentic.....**concolor** Cress.
25. Outer macula with horns pointed towards the apex of the wing.
cubensis Nort.
Outer macula with horns pointed towards the body.
fernaldi n. sp.
26. Smaller macula erect crescentic.....**cubensis** Nort.
Smaller macula not erect crescentic.....27.
27. Abdomen yellow.....**purgatus** Say.
Abdomen not yellow.....**flaviceps** Br.

Enicospilus fuscipennis flavostigma n. subsp.

Similar to *fuscipennis* except that the stigma is flavous, the larger macula appendiculate, and the metathorax has a weak median longitudinal keel.

Described from one female specimen.

Type.—♀. U. S. National Museum.

Distribution.—Cayenne, French Guiana.

Enicospilus guatemalensis Cameron.

Ophion (Enicospilus) guatemalensis Cameron, Biol. Centr. Amer.,

Hym., I, p. 293, n. 9, ♀,

pl. 12, fig. 22.....1886.

Henicospilus guatemalensis Dalla Torre, Cat. Hym., III, p. 182,

listed Guatemala.....1901.

“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.

27, n. 59, listed.....1905.

Pale flavous, vertex yellow, wings hyaline, stigma pale flavous, discocubital cell with one subtriangular horny macula.

Length, 18 mm.

Body flavous, unicolorous; vertex flavous.

Thorax with scutellum more gibbous than in *E. concolor*, not so narrowed behind, scarcely keeled at the sides and not punctured, but finely striated at the apex; metanotum without median keel; wings hyaline; the third discoidal cellule not so dilated at the apical half as in *concolor*; discocubital cell with only one pear-shaped macula; nervulus interstitial.

In the unicolorous body this species agrees with *E. concolor* but is much smaller and the color more dilute in tint; *E. flavus* may be known from this species by the deeper fulvous tint of the body, by the middle of the vertex being black and the mesonotum punctured; the metanotum is much more strongly wrinkled and the macula of the discocubital cell more strongly pointed at the apex.

I have not seen a specimen of this species, and am not sure of its identity, but it appears to be closely related to *E. purgatus*.

Type.—♀. British Museum.

Distribution.—San Gerónimo, Guatemala.

Enicospilus fuscipennis Szep.

Henicospilus fuscipennis Szepligeti, Ann. Hist. Nat. Mus. Nation-

alis Hung., IV, Part I, p. 147, ♀.....1906.

“ *persimilis* Szepligeti, Idem, p. 147, ♂.....1906.

Fulvous; vertex, antennæ, stigma and abdomen beyond the second segment black; discocubital cell with two maculæ.

Length, 19–25 mm.; wing, 14–16 mm.; spread, 30–34 mm.; antennæ, 20–26 mm.

Head flavous; vertex and antennæ black; antennæ as long as or longer than the body; ocelli large, well separated, the posterior close to the tops of the eyes; eyes large, emarginate; face sometimes with a more or less distinct median black band, running from the anterior ocellus to or below the antennal fossæ,

Thorax dull fulvous; mesonotum indistinctly tinged with fuscous; mesopleuræ smooth; scutellum with lateral keels; metathorax with strong anterior transverse carina, in front of which it is smooth, behind with arcuate wrinkles.

Wings slightly tinged with fulvous or light brown, stigma and nervures fuscous to black; discocubital cell with two maculæ, the larger triangular, not appendiculate, the smaller round, or slightly elongate, nervulus antefurcal, nervellus broken below the middle, discocubital vein bent, the first recurrent vein two-thirds the length of the second.

Legs fulvous, claws pectinate.

Abdomen with the two basal segments fulvo-ferruginous, beyond the second segment black, the lower apical corner tinged with fulvous.

In redescribing this species I have compared two female specimens with the original description.

Type.—♀. Hungarian National Museum.

This species shows some variation in color and shape of the maculæ as in other species; the smaller macula may be circular or almost linear, and the wings vary from hyaline with only a slight fulvous tinge to light brown. Szepligeti has based a new species—*persimilis*—on these two differences, but specimens before me show that they are variable. His specimens with finely rugose metathorax are only minor variations.

Distribution.—This species has a fairly wide range through Peru, Bolivia and Brazil, and probably north into Venezuela. Szepligeti's types came from Mapiri, Bolivia, and Minas Geraes and Blumenau, Brazil, and his other specimen, the type of *persimilis*, from Pachitea, Peru, while I have seen specimens from Peru.

Nothing is known of the life history or habits.

Location of specimens.—Hungarian National Museum. Type ♀; also type ♂ *persimilis*. U. S. National Museum, two ♀'s, Peru.

Enicospilus bicolor Tasch.

- Ophion bicolor* Taschenberg, Zeitschr. f. d. Ges. Natur., 46, p. 434,
n. 19, ♀1875.
“ “ Dalla Torre, Cat. Hym., III, p. 1881901.
“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 27, n.
531905.

Testaceous, antennæ and apex of abdomen black, wings flavo-hyaline, with two horny maculæ, the larger cordate, appendiculate, the smaller crescentic.

Length, 24 mm.

Head testaceous, antennæ and eyes black; thorax uniformly shell-yellow, somewhat sericeous, especially the weak metathorax; the anterior transverse carina of the metathorax not uniting with the lateral carinæ but running out before reaching them; the surface finely rugose.

Wings tinged with fulvous, the discocubital cell with two maculæ, the larger heart-shaped with an arcuate continuation extending along the border of the glabrous area, in the middle of which the pale crescent-shaped smaller macula stands upright.

Abdomen with the three basal segments shell-yellow; the fourth has only a lateral spot of this color at the base, and the rest only a reflection on the outer lateral angle, otherwise black.

I have not seen a specimen of this species, and can only give a free translation of Taschenberg's description.

Type.—♀. Nova Friburgo, Brazil; location unknown.

Taschenberg considered this species as “standing very near *E. nigricornis* Br. in color and shape of the maculæ, but could not call its color rufous,” as in the latter, he “also found the color of the abdomen different, and the angle which the second recurrent vein forms with the outer edge of the large cell is certainly more blunt than in *E. nigricornis*; if even its sides are the same.” As *E. nigricornis* Br. has only a linear, oblong macula, the two should not be confused.

Distribution.—Nova Friburgo, Brazil.

Enicospilus fuscicornis Cam.

- ? *Ophion sphacelatus* Erichson, Schomburg's Reisen in British
Guiana, Part III, p. 5871848.
“ (*Enicospilus*) *fuscicornis* Cameron, Biol. Centr. Amer.,
Hym., I, p. 291, n. 8, ♀1886.
Henicospilus fuscicornis Dalla Torre, Cat. Hym., III, p. 1821901.
“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 27, n. 581905.

Rufous, thorax flavous, head with distinct longish tubercle below the dark fuscous, almost black antennæ; wings with two horny maculæ; stigma yellow or fulvous.

Length, 30 mm.

Head yellowish, antennæ dark fuscous, almost black, with a distinct longish tubercle below the base; thorax flavous, pleuræ and scutellum yellowish, mesonotum marked with dark fulvous, not fuscous; metathorax smooth and impunctate, with a rather indistinct anterior transverse carina, behind which it is faintly wrinkled.

Wings with stigma yellow or fulvous; discocubital cell with two maculæ; apex of abdomen fuscous.

I have not seen a specimen of this species, and can only give Cameron's description slightly modified.

Type.—♀. British Museum.

Cameron remarks that this species considerably resembles *E. flavo scutellatus* in color, but differs in being smaller, with a distinct longish tubercle below the antennæ and no dark fulvous markings on the mesonotum. Comparison of the descriptions shows that it is very closely related to *E. sphacelatus* Erich., and it is perhaps a synonym of that species.

Distribution.—San Gerónimo, Guatemala.

Enicospilus nigricornis Br.

- Ophion nigricornis* Brullé, Hist. Nat. Ins., Hym., IV, p. 141, n. 8,
Brazil1846.
" " Dalla Torre, Cat. Hym., III, p. 196.....1901.
Henicospilus nigricornis Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 27, n. 64.....1905.

Rufous, apex of abdomen fuscous; vertex and antennæ black; head, sides of thorax and scutellum flavous; discocubital cell with one linear arcuate macula.

Length, 25 mm.

Head yellow, vertex in ocellar region black; antennæ black, with the first joint red beneath and the second red at the extremity; thorax with pleuræ and scutellum flavous; mesonotum marked with three indistinct brown lines; first region of the metathorax smooth, the posterior edge raised, with two small median lobes; second region with sides irregularly rugose and angled, the convexity being directed backward.

Wings with glabrous area of discocubital cell containing an arched red line; the nervures are brown and the stigma red.

Abdomen with first two basal segments red, the third red at the base and dorsally—the rest yellow—the fourth yellow, with the posterior half brown, the rest of the abdomen brown.

Type.—Location unknown to me.

I have not seen a specimen of this species, and can only give a free translation of Brullé's description. There is some question as to the right location and even validity of the species; the linear macula may be an abnormality, and the species belong in reality to the Genus *Eremotylus*, or a second macula may have been lacking in the type and the species, while belonging to the Genus *Enicospilus*, may prove to have been already described.

Distribution.—Brazil.

Enicospilus cressoni* n. sp.

? *Ophion* (*Enicospilus*) *mexicanus* Cameron, Biol. Centr. Amer.,
Hym., 1, p. 290, n. 1, pl. 12, fig. 23, Cordoba, Mexico;
San Gerónimo, Guatemala.....1886.

Flavo-fuscous, vertex and antennæ black, metanotum dark fuscous, abdomen flavo fuscous; discocubital cell with one usually appendiculate macula.

Length, 20–25 mm.; wing, 14–16 mm.; spread, 30–34 mm.; antennæ, 20–26 mm.

Head flavous, vertex and antennæ black; ocelli large, prominent, well separated; eyes large, emarginate; clypeal foveæ distinct; thorax flavous; mesonotum dark fuscous or black—in some specimens this may be divided into three longitudinal stripes—sternum and thoracic sutures fuscous; scutellum flavous; metathorax with a distinct anterior transverse carina, in front of which it is smooth, behind finely reticulate, with more or less distinct arcuate carinæ.

Wings hyaline, iridescent, slightly tinged with fulvous; stigma fulvous, nervures slightly fuscous; discocubital cell longer than usual, with one triangular macula having a short arcuate appendix; basal half of radial vein slightly thickened, with a short distinct arc in the center; nervulus antefurcal, to interstitial, nervellus broken far below the middle; first recurrent vein about one-third the length of the second. Legs flavous, claws pectinate. Abdomen flavo-fuscous.

Described from three ♀ cotypes from Mexico and Santo Domingo.

Cotypes.—Two ♀'s, Mexico; one ♀, Santo Domingo; American Entomological Society.

This species apparently resembles the specimens which Cameron considered *E. mexicanus* Cresson; the color, long

* Named in honor of Mr. E. T. Cresson.

discocubital cell, etc., are alike in both, but Cameron's plate shows that his specimens had two maculæ. This is apparently only a variation and they probably belong with this species, but certainly are not *E. mexicanus* Cress.

Nothing is known of the life history, habits, or hosts of this species.

Enicospilus fernaldi* n. sp.

Flavo-fulvous, sericeous, vertex black, mesonotum with three more or less distinct fuscous stripes, abdomen beyond the fourth segment dark fuscous or black, stigma fulvous, discocubital cell with two maculæ, the larger with a more or less distinct appendix.

Length, 12-18 mm.; wing, 10-12 mm.; spread, 21-26 mm.; antennæ, 12-18 mm.

Head flavous, vertex and antennæ fuscous; eyes large, emarginate; clypeal foveæ distinct.

Thorax of general color, fulvous, more or less tinged with flavous, and in one specimen almost entirely of a greenish yellow; pectus, and rarely the scutellum, flavous; mesonotum with three more or less distinct fuscous stripes; scutellum usually flavous; metathorax with weak anterior transverse carina, in front of which it is smooth, behind densely and finely rugose; wings hyaline, iridescent, stigma flavous, discocubital cell with two maculæ, the larger with a more or less distinct short appendix, the smaller erect crecentic, at the other end of the glabrous area; nervulus antefurcal to interstitial, nervellus broken well below the middle; first recurrent vein one-half the length of the third.

Abdomen with the four basal segments fulvous, beyond the fourth segment black; the two basal segments linear, of about equal length.

Described from two ♀ and one ♂ specimens.

Cotypes.—Two ♀'s and one ♂ in U. S. National Museum from San Francisco Mountains, Santo Domingo.

This species resembles *E. flavus* in color but is smaller. The antennæ and apex of the abdomen are black, not fuscous as in *flavus*; the maculæ also differ in shape. It does not seem to be *E. bicolor*, for in that species the wings are flavo-hyaline, and the amount of flavous on the abdomen differs.

Distribution.—San Francisco Mountains, Santo Domingo, September, 1905.

Nothing is known of the life history and habits.

* Named in honor of Prof. C. H. Fernald.

Enicospilus monticola Cam.

- Ophion* (*Enicospilus*) *monticola* Cameron, Biol. Centr. Amer.,
Hym., I, p. 292, n. 7, pl.
12, fig. 28.....1886.
Henicospilus monticola Dalla Torre, Cat. Hym., III, p. 182.....1901.
" " Szepligeti, Gen. Ins., 34^{me} Fasc., p. 27, n. "
62. ♀1905.

Luteous to fulvous; antennæ, vertex and third to eighth segments of the abdomen black, wings hyaline, stigma black, discocubital cell with two maculæ.

Length, 22-25 mm.; wing, 18 mm.; spread, 38 mm.; antennæ, 25 mm.

Luteous to fulvous, eyes and face flavous, vertex black; ocelli large, prominent, well separated; antennæ black, slender, about as long as the body; thorax of the general color; mesonotum more or less tinged with black, scutellum long and narrow,* with distinct lateral keels; metathorax with strong anterior transverse carina in front of which it is smooth, behind coarsely reticulated, with median keels straight at the base, then diverging towards the sides.* Wings hyaline, iridescent; stigma and nervures black; basal half of radial vein slightly thickened; discocubital cell with two maculæ, the larger subtriangular, the smaller varying from circular to almost crescentic; discocubital vein with the outer two-thirds nearly parallel to the discoidal vein; first recurrent vein one-half the length of the second; nervulus antefurcal to interstitial; nervellus broken far below the middle; legs of the general color, claws pectinate.

Abdomen with the two basal segments subequal, the first becoming gradually thickened toward the apex; segments 3 to 8 black.

In redescribing this species I have compared one specimen with the original description.

Cotypes.—Two ♀'s, British Museum.

Distribution.—This species is apparently tropical or sub-tropical; the two cotypes were taken at Las Mercedes, Guatemala, at 3,000 feet, and San Indro at 1,600 feet, and I have specimens before me from Mexico and from Santo Domingo, West Indies.

Nothing is recorded of the life history, habits or hosts.

* Cameron says "with a transverse keel towards the basal half, behind which it is smooth; in front of it coarsely reticulated and bearing in the center keels which are straight at the base and then diverge toward the sides," but in the specimen before me it is as I have described.

Location of specimens.—British Museum, two ♀ cotypes.
U. S. National Museum, from Santo Domingo and Mexico.
American Entomological Society (Philadelphia), ♀, Mexico.

Enicospilus nigricauda Tasch.

- Ophion nigricauda* Taschenberg, Zeitschr. f. d. Ges. Natur.,
46, p. 437, n. 27, ♀1875.
" " Dalla Torre, Cat. Hym., III, p. 196.....1901.
Henicospilus nigricauda Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 27, n. 63.....1905.

Testaceous, vertex flavous, apex of abdomen black, wings hyaline, veins fuscous, discocubital cell with one macula.

Length, 18–20 mm.

Sericeous to testaceous, vertex and occiput sulphur-yellow; ocelli large, filling the space between the tops of the eyes completely.

Scutellum and spots on the pleuræ sulphur-yellow; metanotum with an anterior transverse carina and lateral longitudinal ridges; with fine irregular transverse ridges behind the shell-yellow ground color of the scutellum and mesopleuræ, often somewhat lighter. Wings hyaline, with one macula in the discocubital cell; nervures shining fuscous.

Abdomen black from the fifth or tip of the fourth segment to the apex.

I have not seen specimens of this species, and can only give a free translation of Taschenberg's description.

Cotypes.—Three ♀'s, location unknown to me.

This species resembles *E. flavus*, but the latter has the vertex black and the apex of the abdomen at the most only fuscous.

Distribution.—Brazil; Venezuela.

Enicospilus thoracicus (Cress.).

Plate III, fig. 22.

- Ophion thoracicus* Cresson, Proc. Ent. Soc. Phila., IV, p. 55, ♀,
Cuba1865.
" " " Proc. Acad. Nat. Sci. Phila., p. 374, n.
2, Cordova.....1873.
" *trimaculatus* Taschenberg, Zeitschr. f. d. Ges. Natur., 46,
p. 433, n. 18, ♀1875.
" (*Enicospilus*) *thoracicus* Cameron, Biol. Centr. Amer.,
Hym., I, p. 291, n. 3, Mexico,
Cuba1886.
" *thoracicus* Fox, Trans. Amer. Ent. Soc., 18, p. 337,
Jamaica1891.

- Enicospilus thoracicus* Ashmead, Trans. Ent. Soc. Lond., p. 271,
n. 182, p. 354, n. 1092.....1900.
Henicospilus thoracicus Dalla Torre, Cat. Hym., III, p. 184.....1901.
Ophion trimaculatus Dalla Torre, Idem, p. 1991901.
Henicospilus thoracicus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
27, n. 66.....1905.
 " *trimaculatus* Szepligeti, Idem, p. 27, n. 681905.
 " *trispilus* Szepligeti, Ann. Hist. Nat. Musei Nationalis
Hung., IV, p. 1451906.

Fulvous, antennæ flavo-fuscous, vertex flavous, mesonotum with three longitudinal stripes more or less distinct; discocubital cell with one large macula and two lines; vertex flavous.

Length, 21–28 mm.; wing, 16–18 mm.; spread, 34–38 mm.; antennæ, 21–30 mm.

Fulvous, sometimes varied with fuscous; head flavous—in one specimen rufous—ocelli large, prominent, well separated, the two posterior close to the tops of the eyes; eyes large, emarginate; antennæ fulvous, more or less tinged with fuscous, as long as the body; clypeal foveæ distinct.

Thorax flavo-fuscous, clothed with fine short pubescence; pectus flavous; mesonotum with three broad black longitudinal stripes, sometimes indistinct behind; scutellum flavous; metathorax tinged with fuscous or black, slightly hollowed behind, with a distinct anterior transverse carina, in front of which it is smooth, behind with longitudinal and sometimes transverse carinæ, frequently a weak median longitudinal carina is present.

Wings hyaline, faintly iridescent; stigma and most of the costa flavous, nervures otherwise fuscous; discocubital cell with one large subtriangular macula and two lines, the anterior short and straight, the posterior long and curved; usually distinctly separated from the macula, but in one specimen faintly connected; nervulus antefurcal to interstitial; nervellus broken far below the middle; radius with basal half thickened; discocubital vein bent; legs fulvo-ferruginous, sometimes slightly lighter colored than the rest of the body.

Abdomen strongly compressed and shining, the two basal segments linear, of about equal length, slightly dilated toward the tips. The entire abdomen, especially the two basal segments, more or less fuscous.

In redescribing this species I have examined the cotypes and four ♀ and one ♂ specimens.

Cotypes—Two ♀'s, Mexico, Cuba; in collection of American Entomological Society (Phila.).

A distinct species easily recognized by its size, three black

stripes on the mesonotum, and shape of the three maculæ. In one male specimen from Mexico the entire abdomen is dark fuscous, but this is perhaps due to greasing. Cameron seems to intimate that what I call *thoracicus* is really *flavo-scutellatus* Br., but this is impossible, for Brullé's species has only one macula in the wing while *thoracicus* has three, or at least (sometimes) two. *E. trispilus* Szep. is apparently a synonym of this species, and *Ophion trimaculatus* Tasch.* certainly is.

Distribution.—This species is apparently tropical but with a wide range which may extend beyond the tropics. It has been reported from Cordova, San Rafael (Jicoltepec) Mexico; Cuba; Bog Walk, Parish of St. Catherine, Jamaica; Merida, Venezuela; Mapiri, Bolivia; Nova Friburgo, Brazil; and I have seen specimens from Mexico; Cuba; Balaclava, Jamaica; San Francisco Mountains, Santo Domingo, and Chachamayo, Peru.

Life history.—Nothing is recorded concerning the life history of this species and no hosts have been reported. One specimen from Santo Domingo was taken in September. The single cocoon which I have seen is dark brown with two irregular, longitudinal black stripes: 20 mm. long and 8.5 mm. broad.

Location of specimens.—American Entomological Society, two ♀ cotypes, No. 77. U. S. National Museum, homotypes and specimens from San Rafael, Mexico; Cuba; Jamaica; San Francisco Mountains, Santo Domingo; Grenada. Massachusetts Agricultural College, homotype, ♂, Mexico. Hungarian National Museum. Three ♂ cotypes of *E. trispilus* from Mexico, Venezuela, and Bolivia.

* The name *Ophion trimaculatus* Taschenberg, 1875, was a homonym, having already been used by Olivier, *Encycl. Meth., Ins.*, VIII, p. 59, 1811, sixty-four years before. Szepligeti transfers the species to the Genus *Enicospilus*, but with no change of name and even if the species were good the name is not valid. According to rulings of the Committee of Nomenclature, "A stillborn homonym can not be used again even when a species is transferred to another genus."

Enicospilus flavo-scutellatus (Br.)

Ophion flavo-scutellatus Brullé, Hist. Nat. Ins., Hym., IV, p. 140,
n. 6, Brazil.....1846.

" (*Enicospilus*) *flavo-scutellatus* Cameron, Biol. Centr.
Amer., Hym., I, p. 291,
n. 4, pl. 12, fig. 25,
Guatemala, Costa Rica.1886.

Henicospilus flavo-scutellatus Dalla Torre, Cat. Hym., III, p. 181..1901.

" " " Szepligeti, Gen. Ins., Hym., 34^{me}
Fasc., p. 27, n. 56.....1905.

Luteous; head, sides of thorax and scutellum flavous; mesonotum with three fuscous lines, metathorax weakly rugose, wings with one red macula.

Length, 25-30 mm.

Pale yellow, a little reddish, head, pleuræ and scutellum sulphur-yellow, antennæ slightly ferruginous; mesonotum luteous, with three broad black or brown lines of which the median is incomplete; metathorax with distinct median keel, the first region smooth, with a carina reentrant in the middle like a very open band; second region finely rugose, with more or less distinct broad transverse fuscous band; wings with stigma red, nervures brown, the glabrous area of the discocubital cell with one red macula; apical segments of the abdomen brown.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Type.—Location unknown to me.

I am not sure of the identity of this species; Cameron's specimens were evidently *thoracicus* in which the small third macula was lacking, for his plate shows this condition, which is often found in that species. They can not be *flavo-scutellatus*, which, according to the original description, has only one macula. Cameron lists *thoracicus* from Mexico and Cuba, but does not state how he separates the two species.

Distribution.—Rio Grande, Brazil; Cerro Zunil, Guatemala; Irazu, Costa Rica

This species is apparently tropical, but its exact range is still unknown.

Location of specimens.—British Museum.

Enicospilus guatemalensis (Cam.)

Ophion (Enicospilus) guatemalensis Cameron, Biol. Centr. Amer.,
Hym., I, p. 293, n. 9., ♀,
pl. 12, fig. 221886.

- Henicospilus guatemalensis* Dalla Torre, Cat. Hym., III, p. 182,
 listed, Guatemala.....1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me}
 Fasc., p. 27, n. 59, listed 1.....1905.

Pale flavous, vertex yellow, wings hyaline, stigma pale flavous, discocubital cell with one subtriangular horny macula.

Length, 18 mm.

Body flavous, unicolorous, vertex flavous. Thorax with scutellum more gibbous than in *E. concolor*, not narrowed behind, scarcely keeled at the sides and not punctate but finely striate at the apex; metanotum without median keel; wings hyaline, the third discoidal cellule not so dilated at the apical half as in *concolor*, discocubital cell with one pear-shaped macula, nervulus interstitial.

In its unicolorous body this species agrees with *E. concolor* but is much smaller, and the color more dilute in tint; *E. flavus* may be separated from this species by the deeper fulvous tint of the body, by the middle of the vertex being black, and the mesonotum punctate.

I have not seen a specimen of this species, and can only give Cameron's description rearranged. It is apparently closely related to *E. purgatus*.

Type.—British Museum.

Distribution.—Guatemala (San Gerónimo).

***Enicospilus neotropicus* n. sp.**

Flavo-fuscous; vertex yellow, pectus and abdomen fuscous; antennæ fulvous to fuscous; stigma fulvous, wings with one macula.

Length, 16–20 mm.; wing, 11–14 mm.; spread, 24–30 mm.; antennæ, 15–20 mm.

Body clothed with fine, short pubescence.

Head flavous; ocelli large, prominent, well separated, the posterior close to the tops of the eyes; eyes large, emarginate; antennæ as long as the body, flavo-fuscous with a weak, sometimes indistinct, carina between the antennal fossæ; clypeal foveæ distinct, mandibles bidentate, tipped with black.

Thorax flavo-fuscous, pectus fuscous, mesonotum varying from light to dark fuscous, with three more or less distinct longitudinal black lines; pleuræ flavous, tinged with black; metathorax rounded behind, with a weak anterior transverse carina, in front of which it is smooth, behind finely reticulated; wings hyaline, iridescent, stigma fulvous, nervures fuscous; nervulus postfurcal to interstitial, nervellus broken far below the middle, basal half of radial vein slightly enlarged, discocubital vein bent, discocubital cell with one subtriangular macula; first recurrent nervure three-fourths the length of the second; legs light flavous to fuscous; abdomen fuscous, more or less tinged with black.

Described from two female and two male cotypes.

Cotypes.—♀ and ♂, U. S. National Museum; ♀ and ♂, Massachusetts Agricultural College.

This species is related to *E. guatemalensis* in structure, venation and shape of the macula, but shows a constant wide difference in color. Cameron described *guatemalensis* from a single female specimen which may prove to be an albino, but as the description is so incomplete and the type unavailable, the question can not be settled without a large number of specimens. *E. neotropicus* seems, however, to be a good species.

Distribution.—This species is apparently tropical, for it has been taken in the San Francisco Mountains, Santo Domingo, and in Chili.

Nothing is known of the life history or habits, but two of the cotypes were taken in Santo Domingo during September.

Location of specimens.—U. S. National Museum, cotypes from Santo Domingo. Massachusetts Agricultural College, cotypes.

Enicospilus brulléi* n. n.

Ophion striatus Brullé, Hist. Nat. Ins., Hym., IV, p. 142, n. 11...1846.

" " Dalla Torre, Cat. Hym., III, p. 199,.....1901.

Henicospilus striatus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.

27, n. 65.....1905.

Rufous, vertex black, pleuræ and scutellum flavous; wings with one macula.

Length, 20 mm

Red, head yellow, vertex and longitudinal shaft of the face black, thorax with sides yellow; mesonotum marked with three broad, light brown lines; edges of mesothorax of the same color, scutellum flavous; metathorax with the posterior edge of its first region nearly straight, the second region with distinct transverse wrinkles; wings with the nervures brown, stigma yellowish red; discocubital cell with one macula at the end of the glabrous area; abdomen "lost beyond the third segment."

* This species was originally described by Brullé as *Ophion striatus*, but it evidently belongs in the genus *Enicospilus*. It was first transferred to that genus by Szepligeti in 1905, but with no change of name; the specific name was, however, preoccupied by *E. striatus* Cameron, 1899, and according to the International Code, Art. 34, *E. striatus* must be rejected as a homonym. I therefore rename this species *Enicospilus brulléi*.

I have not seen a specimen of this species, and can only give a free translation of Brullé's description.

Type.—Location unknown.

Distribution.—Rio de Janeiro, Brazil.

Enicospilus trilineatus (Br.).

<i>Ophion trilineatus</i> Brullé, Hist. Nat. Ins., Hym., IV, p. 140, n. 7,	
Brazil	1846.
" Dalla Torre, Cat. Hym., III, p. 199.....	1901.
<i>Henicospilus trilineatus</i> Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc.,	
p. 27, n. 67.....	1905.

Luteous; head, thorax and scutellum flavous; vertex black, mesonotum with fuscous lines, metathorax slightly striated, stigma flavous, discocubital cell with one macula; antennæ with basal two-thirds black.

Length, 22 mm.

Head yellow, vertex black in ocellar region; basal two-thirds of antennæ black.

Thorax with sides partly yellow and partly red; mesonotum yellow, with three brown lines sometimes indistinct; metathorax slightly striated with the first region more prominent at the posterior edge than in *flavo-scutellatus*, and nearly straight; second region without longitudinal keels, its wrinkles forming quite regular arched lines; scutellum flavous.

Wings with stigma yellow, the glabrous area of the discocubital cell with one small red macula (speck).

Abdomen with three basal segments red, sides of the third and fourth yellow, the latter with a ventral triangular brown spot more or less drawn out, the rest entirely brown.

I have not seen a specimen of this species and can only give a free translation of the original description.

Type.—Location unknown to me.

This species resembles *E. flavoscutellatus*, but differs in that the pleuræ are partly yellow and partly red, and the vertex in the region of the ocelli black.

Distribution.—Rio de Janeiro, Brazil.

Enicospilus flavus (Fabr.).

Plate III, fig. 24.

<i>Ichneumon flavus</i> Fabricius, Syst. Ent., p. 341, n. 76.....	1775.
" " " Spec. Ins., I, p. 436, n. 96.....	1781.
" " " Mant. Ins., I, p. 268, n. 114	1787.
" " Gmelin, Linné; Syst. Nat., ed. 13 ^a I, 5, p. 2707,	
n. 178.....	1790.

- Ichneumon flavus* Christ, Naturg. d. Ins., p. 360.....1791.
 " " Olivier, Ency. Method., Ins., VII, p. 196, n. 1571792.
 " " Fabricius, Ent. Syst., II, p. 179, n. 1881793.
Ophion flavus Fabricius, Suppl. Ent. Syst., p. 236, n. 3.....1798.
 " " " Syst. Piez., p. 131, n. 4.....1804.
 " " Olivier, Ency. Method. Ins., VIII, p. 509, n. 51811.
Ichneumon flavarius Thunberg, Mem. Acad. Sci., St. Petersburg, VIII, p. 262.....1822.
 " " Thunberg, Mem. Acad. Sci., St. Petersburg, IX, p. 314.....1824.
Ophion flavus Guérin and Percheron, Gen. Dis. Ins., liv. 2, H. 7, T. 31835.
 " " Brullé, Hist. Nat. Ins., Hym., IV, p. 139, n. 3, ♀ Cayenne.....1846.
 " " Guérin, Ramon de la Sagra, Hist. Fis. Cuba, VII, p. 7531857.
 " " Cresson, Proc. Ent. Soc. Phila., IV, p. 57, Cuba...1865.
 " (*Enicospilus*) *flavus* Cameron, Biol. Centr. Amer., Hym., p. 292, n. 6, tab. 12, f. 21, Cordova, Mexico; Chontales, Nicaragua; Antilles, Cuba.....1886.
 " *flavus* Fox, Trans. Amer. Ent. Soc., XVIII, p. 338, numerous specimens from Port Antonio, Jamaica...1891.
 " *flavum* Ashmead, Journ. Linnean Soc. Zool., XXV, p. 58, St. Vincent Island.....1894.
Enicospilus flavus Ashmead, Trans. Ent. Soc. Lond., p. 270, n. 181, 3541900.
Henicospilus flavus Dalla Torre, Cat. Hym., III, p. 181, Centr. America1901.
Ophion (*Enicospilus*) *appendiculatus* Felt, Psyche, IX, p. 308, n. I..1902.
Enicospilus appendiculatus Felt, N. Y. State Mus., Bull. 76 (nineteenth Rept. State Ent.), p. 113, pl. 2, fig. 4, New Brunswick, N. J.; Selma, Ala1904.
Henicospilus flavus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 27, n. 57, listed Am. Centr.....1905.
 " *appendiculatus* Szepligeti, Idem, n. 69, listed Am. Bor.....1905.
Enicospilus flavus Cameron, Journ. Roy. Agr. and Commer. Soc. British Guiana, I, p. 179.....1911.

Flavous to ferruginous, vertex black, apex of abdomen usually fuscous, discocubital cell with one large and one small indistinct macula (pl. 2, fig. 24). *Scutellum flavous; antennæ fulvous to fuscous.*

Length, 12-23 mm.; wing, 11-14 mm.; spread, 23-28 mm.; antennæ, 16-17 mm.

Flavous, more or less tinged with red, and coated with fine short pubescence. Face and occiput flavous, vertex black; ocelli large, prominent, well separated, black with outer ring of yellow. Antennæ fulvous to fuscous, as long as the body; eyes large, emarginate; clypeal foveæ distinct, mandibles bidentate, tipped with black—in one specimen the face is dark red—mesonotum flavo-fuscous, frequently with three longitudinal fuscous stripes; mesopleuræ smooth and polished, yellow, varied with red; scutellum sulphur-yellow. Metathorax with a weak anterior transverse carina, in front of which it is smooth, behind finely reticulate; wings hyaline, stigma yellow, nervures slightly fuscous; discocubital cell usually with two maculæ, one large and subtriangular, with a short appendix, the other small, irregular, frequently indistinct, sometimes lacking; radial vein lightly narrowed near the stigma, thickened beyond, discocubital vein arcuate or in some cases angled, not sinuate, nervulus interstitial to well postfurcal; nervellus broken far below the middle.

Legs usually slightly lighter than the body, claws pectinate; abdomen with the two basal segments linear; usually fuscous beyond the fourth segment. Ovipositor short, 2 mm., male claspers rounded.

In describing this species I have examined thirteen ♀ and eight ♂ specimens.

Type.—Location unknown.

Fabricius' description is so incomplete that determination has hitherto been doubtful. In determining and redescribing this species I have used specimens determined by Mr. E. T. Cresson and Cameron's figure of a wing—which agree—as well as the various descriptions. Cresson notes that *E. flavus* is slightly smaller than *cubensis*, with the abdomen shorter and not so slender, the membranaceous spots nearest the tips of the discocubital cell very small and indistinct. A large series, however, shows that none of these differences are fixed. It is closely related to *E. cubensis* and *E. concolor*, but is readily recognized by the differently shaped maculæ, which appear quite fixed. The type of *E. appendiculatus* Felt shows what the figure and description of the wing* intimate, namely, that it is a synonym of *E. flavus*. Dr. Felt remarks that *appendiculatus* is evidently southern in habitat but fails to recognize it as *flavus*, which is seldom taken far north—probably because that species is so little known and its description is so incomplete.

* N. Y. State Museum, Bull. No. 76, p. 113, pl. 2, fig. 4, 1903.

Distribution.—This species is most abundant in and near the tropics, but ranges from the Upper Austral at New Brunswick, N. J., into the tropics at Chontales, Nicaragua, and the Island of St. Vincent. It has been reported from Mexico; Chontales, Nicaragua; Cuba; San Antonio, Kingston, etc., Jamaica; Mirabeau Estate, St. Vincent Island; Grenada Island; Cayenne; and I have seen specimens from New Brunswick, N. J.; Selma, Ala.; Dallas, Texas; Mexico; Cuba; Portland, Raetown and Kingston, Jamaica; San Francisco Mountains, Santo Domingo.

Life history and habits.—Little is known or at least recorded of the life history, habits or hosts of this species. Three female specimens before me were taken at Selma, Ala., in October; Paris, Texas, September 8; and Dallas, Texas, September 30, respectively. Two females from Santo Domingo were taken in September, and a third from Kingston, Jamaica, in March. *E. flavus* seems therefore to be most abundant in August and September, but the time of flight may extend over several months as with other species.

Location of specimens.—American Entomological Society (Phila.), six ♀'s and seven ♂'s; Cuba; Mexico; Jamaica; Santo Domingo. U. S. National Museum, two ♀'s and two ♂'s, Santo Domingo; Selma, Ala. (two metatypes, *E. appendiculatus* Felt); Portland, Raetown, Kingston, Jamaica; Cuba; San Francisco Mountains, Santo Domingo; Grenada; Windward Islands; St. Vincent; Aguadilla, Porto Rico. New York State Museum (Albany), ♀ from New Brunswick, N. J. (type of *E. appendiculatus* Felt). British Museum.

***Enicospilus concolor* (Cress.).**

Plate II, fig. 12.

- Ophion concolor* Cresson, Proc. Ent. Soc. Phila., IV, p. 56, ♀ ♂,
Cuba1865.
“ (*Enicospilus*) *concolor* Cameron, Biol. Centr. Amer.,
Hym., I, p. 291, pl. 12, fig. 24..1885.
“ *concolor* Fox, Trans. Amer. Ent. Soc., XVIII, p. 337,
Jamaica1891.
“ “ Ashmead, Journ. Linn. Soc. Zool., XXV, p. 58,
listed, Island of St. Vincent.....1894.
Enicospilus concolor Ashmead, Trans. Ent. Soc. Lond., p. 271,
n. 182, Grenada.....1900.

- Henicospilus concolor* Dalla Torre, Cat. Hym., III, p. 181, Cuba...1901.
 " " Szepliget, Gen. Ins., Hym., 34^{me} Fasc., p.
 27, n. 54.....1905.

Pale fulvous; head, pleuræ and scutellum more or less tinged with flavous; vertex fuscous or black; wings hyaline, iridescent, with two maculæ, the larger lanceolate, the smaller linear-oblong, slightly indistinct.

Length, 14-20 mm.; wing, 12-14 mm.; spread, 26-29 mm.; antennæ, 20-24 mm.

Pale fulvous, clothed with fine, short pubescence; head often flavous; antennæ uniformly fulvous, frequently light, as long or longer than the body; ocelli large, prominent, well separated, the posterior close to the tops of the eyes; eyes large, emarginate; clypeal foveæ deep; mandibles bidentate, tipped with black.

Thorax fulvous, pleuræ tinged with flavous; mesonotum slightly fuscous, scutellum more or less yellow; metathorax with an anterior, transverse carina, in front of which it is smooth, behind finely areolated.

Wings hyaline, iridescent, stigma pale fulvous, nervures fulvous to fuscous*; nervulus antefurcal to interstitial, nervellus broken far below the middle, basal half of the radial vein slightly enlarged, discocubital vein bent; discocubital cell with two maculæ, the larger lanceolate, with a more or less distinct appendix, the smaller linear-oblong, often indistinct.

Legs uniformly pale fulvous, claws pectinate.

Abdomen shining fulvous; the two basal segments linear, about equal in length and slightly dilated towards the apex; the second segment stouter than the first; the others compressed and gradually enlarged; the two apical segments sometimes fuscous.

In redescribing this species I have compared the cotypes with five female and one male specimens.

Cotypes.—Two ♀'s and one ♂, No. 76, Cuba, American Entomological Society.

This species is closely related to *E. flavus*, but may be readily recognized by the differently shaped maculæ and usually smaller size. In the specimens which I have seen these characters seem well fixed. Cameron's specimens represent an altogether different species, as the figure shows, but as I have not seen the types or similar specimens I can only treat them among the unknown.

* Specimens which Cameron considered *E. mexicanus* answer this description aside from their having a second macula; this may be a simple variation.

Distribution.—This species is tropical, ranging through most of the West Indies. It has been reported from Cuba, Jamaica, St. Vincent and Grenada, and I have seen specimens from Santiago de Cuba; Portland, Jamaica; and Bridgetown, Barbados.

Nothing is recorded of the life history or habits of this species; the specimen from Barbados was taken on December 1.

Location of specimens.—American Entomological Society: cotypes, two ♀'s and one ♂, No. 76, Cuba; paratypes, two ♀'s and one ♂, Cuba, ♀, Portland, Jamaica. American Museum Natural History, ♀, Santiago de Cuba. Massachusetts Agricultural College, paratype, ♀, Bridgetown, Barbados, December 1, 1902. British Museum.

***Enicospilus purgatus arcuatus* (Felt.)**

Plate III, fig. 23.

- Ophion* (*Enicospilus*) *arcuatum* Felt, Psyche, Vol. IX, p. 307,
February.....1902.
Enicospilus arcuatus Felt, N. Y. State Mus., Bull. 76, pp. 108,
112, pl. 1.....1904.
Henicospilus arenatus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
27, n. 70.....1905.

Light fulvo-ferruginous, varied with fuscous; vertex flavous; wings hyaline, iridescent, with two maculæ, the larger with a long appendix, extending around the outer end of the glabrous area; bulla of discocubital vein distant one-half the width of the third discoidal cell from its apex.

Length, 20–30 mm.; wing, 14–20 mm.; spread, 30–42 mm.; antennæ, 21–33 mm.

Head flavous—in one specimen entirely rufous—vertex flavous; ocelli large, equidistant, prominent, well separated, the posterior close to the tops of the eyes; antennæ slightly longer than the body; eyes emarginate; clypeal foveæ deep; mandibles bidentate, tipped with black.

Thorax sericeous, flavous, more or less tinged with fuscous; mesonotum and metathorax frequently fuscous or ferruginous; pleuræ frequently tinged with fuscous; scutellum prominent, flavous, with lateral keels; metathorax with anterior transverse carina frequently weak or entirely wanting, the anterior fourth smooth, the posterior three-fourths finely areolate, frequently with distinct arcuate keels originating at the insertion of the abdomen; weak median longitudinal furrows are frequently present, with more or less distinct lateral carinæ.

Wings hyaline, occasionally tinged with fulvous, stigma and costa flavous, nervures tinged with fuscous; marginal nervure (costa) slightly thickened and sinuate near the small stigma, discocubital vein weakly sinuate, its bulla one-half the width of the third discoidal cell from its apex; discocubital cell with two maculae in the glabrous area, the larger subtriangular, with a chitinous, usually yellowish, continuation along the hinder margin of the glabrous area to a point beyond the smaller macula, which is anterior and lateral to the center of this area; the smaller subtriangular to crescentic; nervulus antefurcal to interstitial, nervellus broken far below the middle, first recurrent vein about one-half the length of the second. Legs flavous, claws pectinate.

Abdomen flavo-fuscous, strongly compressed and varied with fuscous or black along the venter and at the apex, the two basal segments slender; claspers of male rounded apically.

In redescribing this species I have examined two ♀ cotypes, twelve ♀ and one ♂ specimens.

Cotypes.—Three ♀'s, New York State Museum, Albany; ♀, Cornell University, Ithaca; ♀, Massachusetts Agricultural College. Paratype, U. S. National Museum.

This is a comparatively rare subspecies often confused with *E. purgatus* Say, since it is probably found throughout the range of the latter; it is, however, usually larger and lighter colored than *E. purgatus*, while the larger macula is appendiculate and the bulla of the discocubital vein distant one-half the width of the third discoidal cell from its apex; in *purgatus* the larger macula is usually not appendiculate and the bulla of the discocubital vein is distant only one-fourth of the width of the third discoidal cell from its apex. However, these differences are not constant, but appear in different degrees and combinations in both, and I do not see how *arcuatus* can be considered more than a subspecies. The fact that the distributions of the two coincide favors this view.

Distribution.—The range of this species probably coincides with that of *E. purgatus* Say, although data available at present show a somewhat more limited distribution. The present known range extends from Durham, N. H., to Illinois, and south to Florida and Mexico. It has been reported from Illinois and Georgia, and I have seen specimens from New Hampshire, Massachusetts, Connecticut, Rhode Island, New

York, New Jersey, Colorado, Illinois, Pennsylvania, Florida, and Mexico.

Nothing is recorded of the life history, habits or hosts, but they are probably similar to those of *E. purgatus*. One specimen in the collection of the U. S. National Museum was bred from *Scoliapteryx libatrix*.

Location of specimens.—Specimens will be found in the following collections: American Entomological Society; U. S. National Museum, from Waltham and Provincetown, Mass., (September 5) and Long Island, N. Y.; Pennsylvania State College; Boston Society Natural History; Massachusetts Agricultural College, cotype, etc.; New York State Museum (Albany), cotype; Cornell University, cotype.

***Enicospilus maculipennis* (Cam.).**

- Ophion* (*Enicospilus*) *maculipennis* Cameron, Biol. Centr. Amer.,
Hym., I, p. 292, n. 8, pl. 12,
fig. 29, ♀1886.
Henicospilus maculipennis Dalla Torre, Cat. Hym., III, p. 182....1901.
“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 27, n. 60.....1905.

Flavous; sternum, stigma and three spots on the mesonotum, black; wings hyaline, with substigmatal fuscous band along the base of the radius.
Length, 18 mm.

Head impunctate, shining; antennæ yellow, fuscous toward the apex, longer than the body.

Mesonotum finely and closely punctured with three black spots; scutellum more strongly punctured and with strong lateral keels; mesopleuræ closely punctured, partly black; metanotum with a transverse carina, in front of which there are coarse transverse striations, behind it is finely punctured; pro-, meso- and metasterna black; the black extends from the mesosternum half-way up the mesopleuræ, and is continued in the middle to the base of the posterior wings as an oblique band. *Wings* hyaline, stigma black except at base and apex, where it is yellow; costa yellow, the other nervures black; the larger macula distinct, about one-half longer than broad and obliquely truncated at the apex.

Legs clear, pale yellow; middle coxæ with a black mark on the under side, and the posterior coxæ with a larger mark.

Abdomen with apical half of petiole more or less black, the three following segments inclining to fuscous above.

I have not seen a specimen of this species, and can only

give Cameron's description somewhat rearranged. It is evidently a distinct, well marked species.

Type.—♀. British Museum.

Distribution.—Bugaba, Panama.

Enicospilus sphacelatus (Erichs.).

Ophion sphacelatus Erichson, Schömburg's Reise in Brit. Guiana,
Part III, p. 587, British Guiana.....1848.

“ (*Enicospilus*) *fuscicornis* Cameron, Biol. Centr. Amer.,
Hym., I, p. 291, n. 5, San Geronimo,
Guatemala,1886.

“ *sphacelatus* Dalla Torre, Cat. Hym., III, p. 199.....1901.

“ “ Szepliget, Gen. Ins., Hym., 34^{me} Fasc., p. 32,
n. 110.....1906.

Dark reddish-yellow; apex of abdomen darker, often brown; head flavous, with a small reddish-yellow tubercle below the base of the antennæ; wings hyaline, discocubital cell with two maculæ.

Length, 17 mm.

Dark reddish-yellow; head bright yellow, with a small, rather long, reddish-yellow tubercle below the base of the antennæ; antennæ reddish yellow; wings hyaline, the basal nervures brown, those of the apex reddish-yellow; discocubital cell with two maculæ; abdomen strongly compressed, towards the apex darker, often brown.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Type.—Location unknown.

This species has hitherto been placed among the Ophions, but a glance at the description shows at once that it belongs to the genus *Enicospilus*. The identity of this species is in doubt, as the “small tubercle” may not be constant and the other characteristics given are not definite enough. It is, however, very closely related to *E. fuscicornis* Cam., which is possibly a synonym. The characters agree so far as given and the distribution offers no difficulty.

Enicospilus purgatus (Say).

Plate I, fig. 6; Plate III, fig. 19.

Ophion purgatus Say, Bost. Journ. Nat. Hist., I, p. 238, n. 1, ♂ ♀,
Indiana1835.

“ *lateralis* Brullé, Hist. Nat. Ins., Hym., IV, pp. 141, 142,
n. 9, “la Caroline.”1846.

- Ophion purgatus* Say, Le Conte, Writings of Thos. Say, Ent., II,
p. 694, n. 1, Indiana.....1859
- “ “ Norton, Proc. Ent. Soc. Phila., I, p. 358, n. 1....1863.
- “ “ Riley, Second Ann. Rept. Ins. Missouri, p. 53,
general.....1870.
- “ “ Riley, Idem, p. 53, f. 25.....1870.
- “ *purgatum* Riley, N. Y. Tribune, Nov. 16.....1875.
- “ *purgatus* Cresson, U. S. Geog. Surv. Terr. Rept., 5, p.
708, eastern Nevada1875.
- “ “ Riley, Eighth Ann. Rept. Ins. Missouri, p. 54,
fig. 38.....1876.
- “ “ Packard, Ninth Rept. U. S. Geol. and Geog.
Surv., p. 7041877.
- “ “ Packard, Mass. St. Bd. Agr., 25th Rept., p. 252.....1878.
- “ “ Provancher, Nat. Can., XI, p. 117, n. 2, ♀ ♂...1879.
- “ “ Thomas, Tenth Rept. State Ent. Ill., p. 41.....1881.
- “ “ Riley, U. S. Ent. Comm., Third Rept., p. 128,
pl. 2, fig. 5, life history1883.
- “ “ Caulfield, Can. Ent., 16, pp. 122, 123.....1884.
- “ “ “ Ent. Soc. Ont., Fifteenth Rept., p. 41.....1885.
- “ “ Provancher, Nat. Can., 16, p. 34.....1887.
- “ “ Riley, N. J. St. Bd. Agr., Fifteenth Ann. Rept.,
p. 524.....1888.
- “ *purgatum* Fletcher, Cen. Exp. Farm (Canada), Rept., p.
57.....1888.
- “ *purgatus* Lugger, Univ. Minn. Bienn. Rept. Regents, p.
366, fig. 31.....1888.
- “ “ Provancher, Nat. Can., 19, p. 248.....1889.
- “ *purgatum* Riley and Howard, Insect Life, II, p. 382, reared
from *Scoliopteryx libatrix*.....1890.
- “ *purgatus* Riley and Howard, Insect Life, III, p. 155.....1890.
- “ *purgatum* Ashmead, Col. Biol. Assn., Bull. I, p. 43.....1890.
- “ *purgatus* Packard, U. S. Ent. Comm., Fifth Rept., p. 269...1890.
- “ “ Webster, U. S. Dept. Agr., Div. Ent., Cld. sey.,
Bull. 22, p. 46.....1890.
- “ *purgatum* Ashmead, Smith's Cat. Ins. N. J., p. 25.....1890.
- “ “ Harrington, Ent. Soc. Ont., Twenty-first Rept.,
p. 67.....1891.
- “ “ Osborn, Part. Cat. Animals Ia., p. 15.....1892.
- “ *purgatus* Webster, Ohio Agr. Exp. Sta., Bull. 45, p. 169.....1893.
- “ *purgatum* Evans, Can. Ent., 28, p. 10.....1896.
- “ “ Lugger, Ent. Minn. Agr. Exp. Sta., Second
Rept., p. 10, fig. 17.....1896.
- “ “ Lugger, Minn. Agr. Exp. Sta., Bull. 48, pp. 45-
46, fig. 10.....1896.

- Ophion purgatus* Panton, Ent. Soc. Ont., Twenty-seventh Rept.,
p. 511897.
Enicospilus purgatus Dimmock, Proc. Ent. Soc. Wash., IV, p.
153, n. 45.....1898.
 “ *purgatus* Ashmead, Smith's Ins. N. J., p. 580, fig. 274..1899.
Ophion purgatus Dalla Torre, Cat. Hym., III, p. 198.....1901.
Enicospilus purgatus Ashmead, Proc. Wash. Acad. Sci., 28, p.
233, one ♀, Fox Point, Alaska.....1902.
Enicospilus “ Felt, Nineteenth Rept. State Ent. N. Y.
(N. Y. St. Mus., Bull. 76), p. 108.....1904.
 “ “ Ashmead, Harriman Expedition, Vol.
VIII, Part I, Fox Point, Alaska, July 28...1904.
Ophion purgatus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32,
n. 119.....1905.
Henicospilus purgatus Schulz, Spolia Hymenopterologica, p. 98, n.
1981906.
Enicospilus purgatus Viereck, Smith's Ins. N. J., p. 620, fig. 252..1910.

Fulvous, vertex flavous to fuscous; wings hyaline, iridescent, with two maculæ, the larger subtriangular, often with an appendix separated from, but clearly defined below, the smaller macula, which varies in shape from circular to semicircular, and sometimes nearly crescentic.

Length, 14–24 mm.; wing, 11–15 mm.; spread, 23–32 mm.; antennæ, 15–25 mm.

Fulvous, varied with flavous and fuscous; head flavous, occasionally darker, vertex of general color; ocelli large, prominent, well separated, equidistant; antennæ as long as the body, dark flavous; eyes large, emarginate; clypeal foveæ distinct; mandibles bidentate, tipped with black.

Thorax sericeous, smooth, fulvous, tinged with fuscous or ferruginous; mesonotum smooth, frequently more or less tinged with fuscous, parapsidal furrows indistinct; metathorax with a more or less distinct anterior transverse carina, in front of which it is smooth, behind finely rugose and occasionally with distinct carinæ; wings hyaline, iridescent, sometimes tinged with fulvous, stigma flavo-fulvous, nervures slightly darker; basal half of radial vein thickened but narrowed near the stigma; discocubital vein sinuate, its bulla scarcely one-fourth the width of the third discoidal from its apex; nervulus antefurcal to interstitial; nervellus broken far below the middle, discocubital cell with two maculæ, the larger subtriangular, often with an appendix separated from it, but distinct below the smaller macula, which varies in shape from circular or semicircular to nearly crescentic—in one specimen it is nearly colorless—while the distance from the larger macula shows considerable variation.

Legs flavous or slightly reddish; claws pectinate.

Abdomen strongly compressed, often darker at the apex; the two basal segments long and slender, subtriangular, obliquely truncate, acute posteriorly.

This description has been prepared after an examination of more than 300 specimens.

Type.—Location unknown.

This species is easily recognized by the two maculæ and often a line, in the discocubital cell, and by the light color of the body. *E. arcuatus* is so closely related to *purgatus* that it can only be considered as a subspecies. It is usually noticeably larger, the larger macula always appendiculate and the bulla of the discocubital vein distant one-half the width of the discocubital cell from its apex, while in *purgatus* it is scarcely one-fourth the width from the apex.

Distribution.—This species ranges from the Boreal Zone in southern Alaska (50° lat.) to the Tropical Zone in Mexico (26° lat.), and the West Indies to Chili in South America. I have before me specimens from Fox Point, Alaska*; Washington; Mt. Hood, Oregon; Santa Cruz Mountains, etc., California; Mexico; Chili; Pinar del Rio, Cuba; Jamaica; Brownsville, Texas; Louisiana; Alabama; Florida; Pennsylvania; Illinois; Colorado; Montana; New Hampshire; Grand Lake, Newfoundland; Winnipeg, etc., Canada. Specimens from many intervening places show that it ranges over most of Canada, all of the United States, south into Mexico, Central America, part at least of the West Indies, and Chili in South America.

This wide distribution led me to expect to find two species, but after careful study I have not succeeded.

Life history.—This is the member of the genus most frequently taken in the United States while collecting in the daytime, and the one most common in collections. The adults fly in Massachusetts from the last of May till the last of September, and farther south occasionally from March to December. They are diurnal and probably crepuscular in habit since they are attracted to light to a certain extent.

* "An Indian village at the extreme southeastern corner of the Alaska mainland, July 26."

The life history has already been discussed on page 14, and need not be repeated here. The cocoons are found in the soil or under shelter near the place where the host has transformed. The fact that many females of this species are taken in trap lantern reduces the value of such traps considerably as a means of combating injurious insects.

Economic importance.—Records seem to indicate that this is one of the most valuable species of the genus, since it preys on several insects of considerable economic importance. It has been frequently reported as parasite of the army worm (*Heliophila unipuncta* Haw.) and Prof. Lugger's report shows that it is a very efficient check to that pest. It has also been reared from the Zebra caterpillar (*Mamestra picta* Harr.) another injurious species, and Dr. Dimmock reports it, Proceedings Entomological Society of Washington, IV, p. 153, 1898—as bred from a pupa of *Prionia bilineata* and of a bombycid.

Hosts.

Alabama (Aletia) argillacea Hubn. ; bred specimen.

Coelodasys unicornis Abb. and Smith, Ins. Life, III, p. 155, 1890.

Cutworm spp. ; Riley, Third Rept. U. S. Ent. Comm., p. 128, 1883.

Dipterous Solidago gall ; Felt, N. Y. State Mus., Bull. 76, p. 109, 1904.

Heliophila unipuncta Harr. ; Idem.

Mamestra picta Harr. ; Smith's Ins. N. J., p. 620, 1910.

“ *trifolii* Rott ; Felt, N. Y. State Mus., Bull. 76, p. 109, 1904.

Scoliopteryx libatrix L. ; Felt, Idem.

Schizurx concinna Abb. and Smith ; Felt, N. Y. State Mus., Bull. 76, p. 109, 1904.

“ *unicornis* Abb. and Smith ; Idem.

Telea polyphemus Cram. ; Idem.

Lepidopterous larva ; Insect Life, III, p. 155, 1890.

Falcaria (Prionia) bilineata Pack. ; Proc. Ent. Soc. Wash., IV, p. 153, 1898.

A bombycid moth ; Idem.

Location of specimens.—The U. S. National Museum collection contains specimens of this species from Fox Point, Alaska ; Canada ; Santa Cruz Mountains, Cal. ; San Forge, Lower California ; Reno, Nevada ; Colorado ; Arizona ; Plano, Cypress Mills, and Victoria, Texas ; Milwaukee, Wis. ; Agricultural College, Mich. ; Illinois ; St. Louis, Mo. ; Ithaca, and

Flatbush, N. Y. ; West Chester, Pa. : Hanover, N. H. ; Amherst, Mass. ; Washington, D. C. ; Vienna, Va. ; Tifton, Ga. ; Alabama ; Chebut Territory, Argentina.

Enicospilus cubensis (Norton).

Plate III, fig. 14.

- Ophion cubensis* Norton, Proc. Ent. Soc. Phila., I., p. 358, n. 2, ♀, Cuba.....1863.
 “ “ Cresson, Idem, IV, p. 57, “one Cuban specimen from Osten Sacken, Cole.”.....1865.
 “ “ Ashmead, Journ. Linnean Soc. Zool., XXV, p. 58, listed Isl. St. Vincent.....1894.
Enicospilus cubensis Ashmead, Trans. Ent. Soc. Lond., p. 270, n. 180 ; p. 354, Isl. Grenada, etc.....1900.
Ophion cubensis Dalla Torre, Cat. Hym., III, p. 189.....1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31, n. 95.....1905.

Fulvous, apex of abdomen fuscous or black, stigma and nervures flavous ; discocubital cell with two maculæ, the smaller crescentic, upright, with indistinct appendix ; antennæ fulvous, with apices black.

Length, 14–18 mm. ; wing, 12–14 mm. ; spread, 25–30 mm. ; antennæ, 18–21 mm.

Light reddish-yellow, clothed with fine short pubescence ; vertex fulvous, sometimes tinged with black ; ocelli large, prominent, well separated ; eyes large, slightly emarginate ; antennæ long, slender, the apex black ; face with a short, median, longitudinal carina below the antennæ ; fossæ sometimes piceous ; clypeal foveæ distinct. Mesonotum with three broad, more or less distinct fuscous stripes ; thoracic sutures, pleuræ, and pectus ferruginous to black ; * pleuræ marked with flavous ; scutellum convex, honey-yellow ; metathorax with a weak anterior transverse carina, in front of which it is smooth, behind very finely reticulate, with weak median and lateral longitudinal carinæ.

Wings hyaline, stigma and costa flavous, nervures otherwise fuscous ; radial vein with its basal half slightly thickened ; discocubital vein bent, its outer half nearly parallel with the third discoidal vein ; discocubital cell with two maculæ, the larger triangular, not appendiculate, or only slightly so, the smaller upright, crescentic, its horns pointed outward, and with a colorless appendix ; nervulus interstitial ; nervellus broken below the middle.

Legs fulvous, claws pectinate.

Abdomen with the four basal segments fulvous or slightly lighter, the rest fuscous or black.

* Norton states that in the types the pectus, thoracic sutures, mesothorax and three apical abdominal segments are piceous, but this is not so in the specimens which I have seen.

In describing this species I have examined a cotype,* two ♀ and one ♂ specimens.

Cotypes.—Three ♀'s, location unknown to me.

This species resembles *E. flavus* in size and structure, but the shape of the maculæ and color of the vertex differ.

Distribution.—This species is tropical, having been reported from the Islands of Cuba, St. Vincent, Grenada, Porto Rico and Jamaica, and probably ranges through the rest of the Antilles and possibly to central and tropical South America.

Nothing is known of the life history, habits or hosts.

Location of specimens.—American Entomological Society (Philadelphia), ♂ homotypes?, No. 79; two ♀ and one ♂ specimens, Cuba. American Museum Natural History, ♀ cotypes? or homotypes, Cuba. U. S. National Museum, Cayamas, Cuba; Aguadilla, Porto Rico; St. Vincent.

***Enicospilus flaviceps* (Br.).**

<i>Ophion flaviceps</i> Brullé, Hist. Nat. Ins., Hym., IV, p. 142, n. 10,	
Brazil	1846.
“ “ Dalla Torre, Cat. Hym., III, p. 190	1901.
<i>Henicospilus flaviceps</i> Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p.	
27, n. 55	1905.

Rufous, head flavous, sides of abdomen fuscous; mesonotum faintly trilobate; stigma yellowish, discocubital cell with two yellowish maculæ.

Length, 20 mm.

Rufous, with head yellow; mesonotum faintly trilobate, without distinct brown lines; metathorax with anterior transverse sinuous carinæ, a little emarginate in the middle, behind this strongly punctured, the base with fine longitudinal striæ. Wings hyaline, stigma yellowish, discocubital cell with two yellowish maculæ; nervures brown in the primary, red in the secondary region.

Abdomen a little spotted with brown on the sides below, the border of the segments a little yellowish.

* There is in the American Entomological Society Collection a male specimen of this species presented by Osten Sacken on or before 1868 and labelled by him; as the three ♀ cotypes were in his collection this is probably a homotype. A female specimen in the American Museum of Natural History is also from the Osten Sacken collection and labelled by him, hence probably of similar standing or a possible cotype.

I have not seen a specimen of this species, and can only give a free translation of Brullé's description.

Type.—Location unknown.

Distribution.—Brazil.

TABLE OF ADDITIONAL SPECIES.

1. Stemmaticum (vertex between eyes) not black.....2.
Stemmaticum black.....4.
2. Thorax red; stigma and abdomen beyond the third segment black;
wings light brown; mesopleuræ dull..... **fuscatus** Szep.
Thorax reddish-yellow, often spotted with white and black; stigma
pure yellow.....3.
3. Discocubital cell with *one* macula.....**narvifasciatus** Cam.
Discocubital cell with *more than one* macula.....11.
4. Abdomen wholly black.....**elegans** Szep.
Abdomen not wholly black.....5.
5. The fourth segment of the abdomen black.....6.
The fourth segment of the abdomen not black.....10.
6. Anterior wing with *one* macula**szepligeti** n. n.
Anterior wing with *two* maculæ.....7.
7. Stigma yellow8.
Stigma brown to black.....9.
8. Nervulus antefurcal; antennæ not much longer than the body;
mesopleuræ not spotted with black.....**xanthocarpus** Szep.
Nervulus postfurcal; antennæ nearly twice as long as the body;
mesopleuræ spotted with black.....**xanthostigma** Szep.
9. Wings light brown, the second smaller macula round.
fuscipennis Szep.
Wings almost hyaline, the second smaller macula longish.
persimilis Szep.
10. Stigma yellow; metanotum finely rugose; abdomen beyond the
fifth segment black to brownish.....**brasiliensis** Szep.
11. Discocubital cell with *two* maculæ.....12.
Discocubital cell with *three* maculæ.....**trispilus** Szep.
12. Larger macula appendiculate.....**dispilus** Szep.
Larger macula not appendiculate.....13.
13. Smaller macula circular.....**volubilis** Holm.
Smaller macula not circular**guyanensis** Cam.

Enicospilus brasiliensis (Szep.).

Henicospilus brasiliensis Szepligeti, Ann. Hist. Nat. Mus. Nat.

Hung., IV, Part I, pp. 147, 148, ♀1906.

"Head narrow and sloping behind the eyes; antennæ as long as the body; mesonotum shining; propleuræ striped; mesopleuræ rugose, punctate only below; metanotum somewhat finely and uniformly

rugose; wings with one macula; nervulus slightly postfurcal; second segment (of abdomen?) as long as the first, reddish-yellow; stemmaticum (vertex) of abdomen from the fifth segment on and the fourth segment behind, at the sides, black; pleuræ spotted with yellow; head and scutellum yellow, stemmaticum (vertex) black; wings hyaline, veins black, stigma yellow.

"Length, 22 mm."

I have not seen a specimen of this species, and can only give a free translation of the original description.

Distribution.—Minas Geraes, Brazil. Var. ♀: size only 15 mm., Blumenau, Brazil,

Enicospilus parvifasciatus Cam.

Enicospilus parvifasciatus Cameron, Jour. Royal Agr. and Commer. Soc., British Guiana, I, p. 180...1911.

Length, 18 mm.

"Luteous, the head yellow, the thorax paler, more yellowish in tint, the antennæ more rufous, the apical abdominal segments darker than the basal; three large broad black marks on the mesonotum, a black mark on the apex of the mesopleuræ, commencing near the top and reaching below nearer to the bottom, it becomes gradually widened from the top to the bottom, with the apex and lower side straight; the legs paler in tint than the body; wings hyaline, a small triangular cloud, longer than it is wide at the apex, filling the base of the radial cellule, the costa rufo testaceous, the stigma and nervures black; the recurrent nervure separated from the transverse cubital by four times the length of the latter; the basal abscissa of the radius is thickened to the middle; the transverse median nervure interstitial. The base of metanotum is smooth; the upper part of the apical part is smooth, except for a straight and two curved striæ in the center; the rest strongly, closely transversely striated. There is only one horny point in the forewings; it is conical, longer than it is wide at the apex; the top narrowed, rounded end at the base, the apex transverse except for a small projection on the lower edge. Female."

Distribution.—British Guiana,

Location of specimens.—Georgetown Museum. British Guiana.

Enicospilus dispilus (Szepl.).

Henicospilus dispilus Szepligeti, Ann. Hist. Nat. Mus. Nat. Hung.,

IV, Part I, p. 145, ♀1906.

"Head narrow and sloping behind the eyes. Antennæ as long or longer than the body. Mesonotum somewhat shining. Pro- and mesopleuræ finely and indistinctly punctured, shining; metapleuræ leath-

ery; mesonotum quite finely wrinkled, the basal part smooth. Wings with two maculæ, the larger with broad crescentic appendix, the smaller is round; nervulus antefurcal. Second segment (of abdomen?) longer than the first, reddish-yellow; mesonotum with three brown spots; wings hyaline, veins and stigma reddish-yellow.

"Length, 25 mm."

I have not seen a specimen of this species, and can only give the original description. It is apparently closely related to *E. Volubilis* Holm.

Distribution.—Minas Geraes, Brazil.

***Enicospilus guyanensis* Cam.**

Enicospilus guyanensis Cameron, Journ. Royal Agr. and Commer.

Soc., British Guiana, I, pp. 179, 180.....1911.

Length (not given).

"Luteous, the head pallid yellow, the antennæ of a deeper, more rufous color, wings hyaline, the stigma and nervures ferruginous, the apical nervures darker in tint, the basal horny point large, transverse below, the top basal half roundly widened from the base upwards, the smaller, apical half oblique on the upper two-thirds, the lower projecting into a point, which becomes gradually narrowed towards the apex, the second point is small, its apex broad, rounded, the lower edge rounded, the upper rounded inwardly; the apical abscissa of the discocubital nervure fully one-third longer than the transverse cubital, which is rounded. Basal half of the scutellum with a shallow furrow down the middle; the apical slope with two long and two short stout striæ. Metanotum with irregular longitudinal striæ in the middle of the base, the sides more strongly obliquely striated, the apex with rounded striæ. The middle of mesopleuræ broadly, finely obliquely striated, the striæ stronger on the lower half. Except on the basal and lower parts the metapleuræ are finely striated and punctured. There is a broad black mark in the middle of the seventh abdominal segment on the sides."

Closely related to *E. dispilus* Szep.

Distribution.—British Guiana.

Location of specimens.—Georgetown Museum, Timehri, British Guiana.

***Enicospilus elegans* (Szep.).**

Henicospilus elegans Szepligeti, Ann. Hist. Nat. Mus. Nat. Hung.,

IV, Part I, p. 146, ♀1906.

"Head smooth, narrow and sloping behind the eyes; face almost parallel, clypeus rounded and not separated. Antennæ longer than the body. Mesonotum black, wrinkled; propleuræ with bands of

wrinkles, scutellum bordered, mesopleuræ weakly wrinkled below, metanotum with a single keel-like longitudinal wrinkle on the side, the middle wrinkled below transversely. Wings with two maculæ, the larger without appendix; nervulus antefurcal, nervus parallelus inserted rather higher, nervellus broken wholly below the middle. Claws pectinate. Second segment (of abdomen?) somewhat longer than the first.

"Red; antennæ, ocelli, posterior legs from the femur on and abdomen, black.

"Length, 22 mm."

I have not seen a specimen of this species, and can only give a free translation of the original description.

Distribution.—Blumenau, Brazil.

Enicospilus fuscatus (Szepl.)

Henicospilus fuscatus Szepligeti, Ann. Hist. Nat. Mus. Nat.

Hung., IV, Part 1, p. 145, ♀1906.

"Head obliquely narrowed behind the eyes; mesonotum dull; pleuræ leathery, finely wrinkled and dull; metanotum with strong arcuate wrinkles. The anterior macula without appendix, the posterior not colored, nervulus antefurcal; second segment of abdomen somewhat shorter than the first.

"Reddish yellow; antennæ and abdomen beyond the third segment, black. Wings light brown, nervures and stigma, black.

"Length, 25 mm."

I have not seen a specimen of this species, and can only give a free translation of the original description.

Distribution.—Blumenau, Brazil.

Enicospilus fuscipennis (Szepl.)

Henicospilus fuscipennis Szepligeti, Ann. Hist. Nat. Mus. Nat. Hung.,

IV, Part I, p. 147, ♀1906.

"Similar to *H. fuscatus* except the stemmaticum (vertex) black and the anterior wings with two maculæ; metanotum somewhat coarsely wrinkled; head yellowish.

"Length, 25 mm."

Distribution.—Minas Geraes, Brazil; Mapi, Bolivia.

"Var. Metanotum, arcuate or obliquely wrinkled."

Distribution.—Blumenau, Brazil; Mapi, Bolivia.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Enicospilus szepligetii n. n.*

Hemicospilus seminiger Szepligeti, Ann. Hist. Nat. Mus. Nat. Hung.,
IV, p. 146, ♀1906.

"Mesopleuræ smooth and shining; metanotum somewhat finely wrinkled. One macula, nervulus interstitial. Reddish-yellow; stemmaticum (vertex) and abdomen from the middle of the third segment on, black; antennæ brown; wings light brown, stigma yellow.

"Length, 18 mm."

Distribution.—Sao Palo, Brazil.

"Var. ♀. Scutellum yellow, thorax spotted with yellow, mesonotum with three brown stripes, the third segment of abdomen, almost entirely black, base of antennæ red.

"Length, 20 mm."

Distribution.—Mapiri, Bolivia.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Enicospilus trispilus (Szep.).

Hemicospilus trispilus Szepligeti, Ann. Hist. Nat. Mus. Nat. Hung.,
IV, Part I, p. 145, ♂1906.

Similar to *E. dispilus*.

"Anterior wings with three (more or less distinct, maculæ, the larger macula and its appendix not connected, the smaller pale and longish. Metanotum with weak carinæ along the middle. Reddish-yellow; thorax yellow spotted, scutellum yellow, mesonotum with three brownish spots, metanotum with a light brown transverse spot in the middle, and with two similar spots on the lower half of the post-scutellum; abdomen light brown mottled, from the fourth segment on with a light spot on the side. Wings hyaline, stigma yellow, veins yellowish.

"Length, 22 mm."

Distribution.—Merida, Venezuela.

I place here a male from Mexico in which the brownish marks appear indistinct.

"Var. ♂. The yellow and black marks are sharply outlined. Wings brownish, towards the base yellowish, veins black; segments one to three brown at the ends, apical segments from the fifth on brown. The furrow between mesopleuræ and mesopleuræ strongly punctured."

Distribution.—Mapiri, Bolivia.

I have not seen a specimen of this species, and can only give a free translation of the original description.

* Szepligeti describes in the same volume with this, but eleven pages before, *Enicospilus seminiger* n. sp. from East Africa; this is, therefore, a synonym, and I propose the name *E. szepligetii* to take its place.

Enicospilus xanthocarpus Szep.*Henicospilus xanthocarpus* Szepligeti, Ann. Hist. Nat. Mus. Nat.

Hung., IV, Part I, p. 146 ♀1906.

“Head narrow behind the eyes. Antennæ somewhat longer than the body; mesopleuræ rather smooth; metanotum finely wrinkled. Two chitinous spots, the smaller elliptical; nervulus antefurcal. Reddish-yellow; head and scutellum yellow, stemmaticum black, thorax spotted with yellow, mesonotum with three black spots, abdomen from the fourth segment on, and antennæ black. Wings almost hyaline, veins black, stigma yellow.”

Length, 18 mm.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Distribution.—Mapiri, Bolivia.**Enicospilus xanthostigma** Szep.*Henicospilus xanthostigma* Szepligeti, Ann. Hist. Nat. Mus. Nat.

Hung., Part I, p. 147.....1906.

“Similar to *E. xanthocarpus*. Antennæ almost twice as long as the body; mesopleuræ somewhat wrinkled. The smaller maculæ long and almost S-shaped. Basal half of the antennæ reddish-yellow. Mesopleuræ spotted with black, breast black.”

Length, 25 mm.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Distribution.—Blumenau, Brazil.**Enicospilus volubilis** (Holm.).*Ophion volubilis* Holmgren, Eugenes Resa Insect, p. 410, n. 42,

Argentina, ♂ ♀1868.

“ “ Dalla Torre, Cat. Hym., III, p. 200.....1901.

“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32, n.
1121906.

Rufous; head flavous; apex of abdomen sometimes fuscous; discocubital cell with two maculæ.

Length, 14 mm.

Head flavous, transverse, not buccate, narrowed behind the eyes; frons very short; face narrower, not elevated; clypeus clearly defined, slightly raised; the small foveæ drawn out on both sides at the base, apex truncate; labrum slightly exerted; mandibles slender, curved, teeth of unequal lengths, the lower longer; eyes large, oblong, distinctly emarginate at the base of the antennæ; antennæ nearly as long as the body, apex of the scape lost.

Thorax with the dorsum slightly leathery, not shining; mesothorax oblongate, in the female trilobate, pleuræ with a raised ridge; scutellum elongate-triangular, almost entirely emarginate, punctate; metathorax gradually sloping towards the apex, finely rugose, spiracles elongate, located near the base.

Abdomen compressed; first segment straight, a little shorter than the thorax, postpetiole nearly half as long as the petiole; the second segment about equal in length to the first, towards the base slightly curved; the remaining segments compressed, pubescent, noticeably shorter; ovipositor very short.

Wings moderately broad; externalradial well curved, internal incrasate before the base; discocubital cell with two membranous maculæ—yellow in the female—of which the interior is somewhat larger, subtriangular, the exterior large, circular; the transverse discoidal vein broken, the anal below the middle, the latter giving off a distinct vein from the fracture; the interior cubital vein interstitial, very little curved.

Feet slender; tarsal claws thickly and distinctly pectinate.

Female.—Head entirely flavous; antennæ rufous, apex ferruginous; thorax rufous, pleural sutures pale; abdomen rufous, segments 4 to 7 more or less fuscous. Wings hyaline, stigma and membranous maculæ flavous; radix and squamula rufous. Feet fulvorufous.

Male.—Similar to the female, but the apex of the abdomen not fuscous.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Types.—♀ and ♂. Location unknown.

This species has hitherto been retained in the Genus *Ophion*, but the thickening of the base of the radial vein and presence of maculæ place it at once in the Genus *Enicospilus*. The description, though long, is a little indefinite, and it has not been referred to since the original description except in catalogues.

Distribution.—Buenos Ayres, Argentina.

Genus **OPHIPTERUS** Br.

<i>Ophiopterus</i>	Brullé, Hist. Nat. Ins., Hym., IV, p. 153	1846.
"	Cresson, Proc. Acad. Nat. Sci. Phila., p. 380.....	1873.
"	Cameron, Biol. Centr. Amer., Hym., I, p. 296.....	1886.
<i>Ophionopterus</i>	Ashmead, Proc. U. S. Nat. Mus., No. 1206, pp. 87, 180 (Vol. 23, 1901)	1900.
<i>Ophiopterus</i>	Dalla Torre, Cat. Hym., III, p. 180.....	1901.
"	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 37.....	1905.
"	Schulz, Spolia Hym., p. 96	1906.
"	Schmiedeknecht, Opusc. Ichn. Fasc., XVIII, p. 1424, n. 81.....	1908.

Metathorax globular, produced behind into a neck which receives the first abdominal segment; nervellus straight, claws pectinate;* abdomen compressed, slender; base of radius not enlarged, discocubital vein arcuate, not appendiculate.

Brullé gives the following generic description :

"Wings wholly resembling those of *Ophion* and *Thyreodon*. The peculiar form of the metathorax will not allow it to be placed with either the one or the other of the two preceding. *Ophiopterus* has the metathorax globular and terminated by a sort of neck which receives the base of the first segment of the abdomen. The antennæ are long, slender, filiform and similar, according to the form and pattern of coloration, to the antennæ of most species of *Cryptus*. Their joints are longer than wide, and the first is quite truncate on the outer side. The legs are very long and slender. The claws of the tarsi are short, the pulvillus is quite small. As in *Ophion* the clypeus is without a projection or tooth in the middle. The mandibles are very narrow.

"The abdomen is long and compressed or sharp edged (tranchant) beginning at the third segment; segments one and two are narrow.

"The ovipositor of the female is of medium length."

Generic type.—*O. coarctatus* Br., ♀ (monotypical). Location unknown.

This genus was erected by Brullé for a single species from South America. Since that time four others have been described, one by Cresson and three by Cameron. In 1900 Ashmead tried to improve the generic name by adding an *on*, *Ophionopterus*, but this emendation can not be accepted.—International Code, Art. 19.

A distinct genus, easily recognized by its globular metathorax produced into a neck behind, and its straight nervellus. The venation of the anterior wing closely resembles that of *Thyreodon* and *Athyreodon*, but the straight nervellus

* Dr. Ashmead states (Proc. U. S. Nat. Mus., No. 1206, pp. 86, 87, Vol. XXIII, 1901), that the claws are not pectinate, but none of the descriptions of the genus or tribe mention this character, and I can not learn of the source upon which he drew for such a statement. I have seen only one species—*O. ferrugineus*—but the cotype and four specimens have pectinate claws. As pectinate claws are present in all genera but one in the tribe—*Retanisia*—and this may prove to belong elsewhere, I do not see how Dr. Ashmead's statement can be accepted without further evidence. Szepligeti evidently accepts this, however.

of the posterior wing separates it at once. The wings—in *O. ferrugineus* at least—are comparatively shorter, and their ends more rounded than in any other member of the tribe which I have seen. The members of the genus are not well known, and I can find but one reference to them since the original descriptions.

Distribution.—This is a strictly American genus with only a few species which range from Texas to Brazil. The generic type—*coarctatus*—came from Brazil, but all the other species taken have been reported from Texas and Mexico only. Records and specimens of the various species are so few that no idea of the exact range of any of them can be given.

Nothing has been recorded of the life history, habits or hosts of any member of this genus.

Variation.—One specimen of *O. ferrugineus* Cress. in the U. S. National Museum shows a slight variation or abnormality in venation; in both anterior wings there is a short stub of a vein— $\frac{1}{2}$ mm. long—extending into the fourth submarginal cell, about 1 mm. from the outer end of the radial vein.

Table of Species.

1. Body ferruginous.....**ferrugineus** Cress.
Body black.2.
2. Wings fuscous.....**niger** Cam.
Wings hyaline.....3.
3. Antennæ short, not longer than the head and thorax; wings long;
abdomen black.....**fuscipes** Cam.
Antennæ not short, reaching to the middle of the abdomen.....4.
4. Wings short, not half the length of the abdomen; basal half of
abdomen yellow.....**stratifrons** Cam.
Wings not short, abdomen entirely black.....**coarctatus** Br.

Ophiopterus ferrugineus Cress.

Plate III, figs. 17, 18.

- Ophiopterus ferrugineus* Cresson, Proc. Acad. Nat. Sci. Phila.,
p. 380, ♀, Mexico.....1873.
“ “ Cameron, Biol. Centr. Amer., Hym., Vol.
I, p. 296, listed Orizaba, Mex.....1886.
? *Nototrachys annulicornis* Ashmead, Proc. U. S. Nat. Mus., Vol.
XII, p. 422, ♂, Texas.....1890.
“ “ Dalla Torre, Cat. Hym., III, p. 178,
listed.....1901.

- Ophiopterus ferrugineus* Dalla Torre, Idem, p. 180, listed.....1901.
Nototrachys annulicornis Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
 p. 20, n. 5, listed.....1905.
Ophiopterus ferrugineus Szepligeti, Idem, p. 37, n. 2, listed.....1905.

Ferruginous to fulvous; ocelli small; antennæ with narrow yellowish white band near the apex, base fulvous, clothed with fine white pubescence.

Length, 12-18 mm.; wing, 8-9 mm.; spread, 17-20 mm.; antennæ, 12-18 mm.; ovipositor, 5 mm.

Ferruginous to fulvous; head and thorax clothed with fine white pubescence, with coarse raised punctures; sides of face and posterior orbits yellowish, head slightly produced behind the eyes and bordered with a keel; eyes and ocelli black, eyes not emarginate, ocelli small, well separated from each other and from the tops of the eyes; antennæ as long as the body, filiform, dark ferruginous to fuscous, with yellowish-white band about 5 mm. from the apex, base fulvous; face broad, coarsely punctured; clypeal foveæ distinct; mandibles bidentate, tipped with black.

Thorax of the general color, sutures distinct.

Mesonotum and scutellum separated by a black transverse furrow, in one case with three weak transverse carinæ; mesopleuræ with a small black spot below the base of the wings.

Metathorax globular, finely reticulate, produced behind into a neck two-thirds the length of the hind coxæ, with two more or less distinct dorsal areolets at the insertion of the abdomen; wings hyaline, faintly dusky at the tips; stigma and nervures fuscous; discocubital nervure arcuate, first recurrent vein about two-thirds the length of the second; radial vein not enlarged, its outer end bent upward; radial vein of hind wing becoming indistinct about 1 mm. beyond its union with the transverse cubital vein.

Legs pale ferruginous, the four anterior tarsi more or less yellowish, posterior tarsi, and in some cases the claws, black; with the second and part of the third joints whitish-yellow; posterior coxæ greatly elongate, three times the length of the anterior; trochanters elongate, the four posterior ones half the length of their femora; claws pectinate.

Abdomen long, very slender, strongly compressed, often lighter than the rest of the body, but slightly fuscous above, especially on the second segment; sheath of the ovipositor black, ovipositor moderately long.*

* Cresson describes the ovipositor as very short, but in his ♀ type it is only slightly exserted, being partly enclosed in the sheaths; where fully exserted it is seen to be longer and more slender than in most American members of this tribe.

Redescribed from ♀ type, three ♀ paratypes and four specimens.

Type.—♀. No. 80, Mexico, American Entomological Society (Academy of Natural Sciences, Philadelphia).

Paratypes.—Three ♀'s. No. 80, Mexico, American Entomological Society (Academy of Natural Sciences, Philadelphia).

A distinct species, easily recognized by the ferruginous color of the body, the others being black.

In 1890 Ashmead described *Nototrachys annulicornis*, placing it temporarily in the Genus *Nototrachys*, but practically saying that he did not know where it belonged. Comparison of his type with the type of *ferrugineus* Cress. shows that they are synonymous. The small third tibial spur which Dr. Ashmead mentions seems to be absent. Dr. Ashmead later recognized that his species belonged in this genus, as his labels show, but failed to identify it with *ferrugineus* Cress.

Distribution.—Illinois; Texas; Orizaba, Mexico.

The type of this species came from Mexico; there are four specimens in the U. S. National Museum from Texas. Cameron reports it from Orizaba, Mexico (19°). So far as known it comes from the Upper and Lower Austral zones. It probably ranges south into Central America, but as there are no records of its capture there the exact range can not be determined.

I can find no reference relative to life history, habits or hosts. The specimens in the U. S. National Museum were taken December 26 in Texas.

Location of specimens.—Type ♀, No. 80, Mexico, American Entomological Society (Academy of Natural Sciences, Philadelphia). Paratypes, three ♀'s, No. 80, Mexico, American Entomological Society (Academy of Natural Sciences, Philadelphia). Homotype, ♀, No. —, Texas; Illinois; U. S. National Museum, cotype, No. 2054, of *Nototrachys annulicornis* Ashm. Homotype, three female specimens, U. S. National Museum, cotype, No. 2054, of *Nototrachys annulicornis* Ashm.

Ophiopterus niger Cam.

- Ophiopterus niger* Cameron, Biol. Centr. Amer., Hym., Vol. I, p.
296, n. 2, Hurchihuitle, Mexico; original de-
scription, ♂1886.
" " Dalla Torre, Cat. Hym., III, p. 180, listed.....1901.
" " Szepligeti Gen. Ins., Hym., 34^{me} Fasc., p. 37,
n. 4, listed.....1905

Black; wings nearly fuscous. ♂.

Length, 16 mm.

"Head semiopaque, covered with a depressed pile; a longitudinal keel running down from the ocelli, and from it short striations proceed on either side; thorax finely punctured, a smooth, shining, impunctate space beneath the wings; pronotum at the sides obliquely striated; mesopleuræ at the edges longitudinally striated; mesonotum in front of the scutellum reticulated; metathorax coarsely reticulated; abdomen three times the length of the thorax, shining, impunctate; the three basal segments cylindrical, narrow, the second segment the longest."

I have not seen the type or a specimen of this species and can only give Cameron's description.

Type.—♂. British Museum.

Distribution.—The type came from Hurchihuitle, Mexico, and I can find no other records of capture.

Ophiopterus fuscipes Cam.

- Ophiopterus fuscipes* Cameron, Biol. Centr. Amer., Hym., Vol. I,
p. 296, n. 1, Orizaba, Mexico.....1886.
" " Dalla Torre, Cat. Hym., III, p. 180, listed...1901.
" " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
37, n. 3, listed.....1905.

Black; face, mouth, eyes, pronotal lines, tegulæ, scutellum and base of abdomen flavous; feet fuscous, pale in front; wings hyaline, nervures black; antennæ short, pale yellow beneath.

Length, 12 mm.

"Densely covered with silvery-white pubescence, densest on the pleuræ. Head finely punctured; antennæ short, not much longer than the head and thorax together, the scape pale yellow beneath. Pronotum obliquely, the mesonotum transversely and very strongly, striated, the striations widely separated; a shining impunctate space below the hind wings on the mesopleuræ; the rest strongly longitudinally striated, running at the edges into reticulations; scutellum shining, nearly impunctate; metathorax coarsely reticulated and leaving a gradual slope to the apex.

"Abdomen shining, impunctate, covered with a pale close pile; black, the sides from the third segment obscure rufous; sheath of ovipositor black. Legs in greater part fuscous covered with a pale pile; the femora inclining to rufous on the lower side; the fore legs almost entirely, and the middle legs in front, pallid testaceous."

I have not seen specimens of this species, and can only give Cameron's description without remarks.

Type.—♀. Location unknown.*

Distribution.—The type of this species was taken at Orizaba, Mexico, but there are no other records of capture, hence the range is unknown.

Ophiopterus striatifrons Cam.

Ophiopterus striatifrons Cameron, Biol. Centr. Amer., Hym., Vol.

I, p. 297 (♂ ♀), Ciudad in Durango,

Mexico.....1886.

" " Dalla Torre, Cat. Hym., III, p. 180.....1901.

" " Szepliget, Gen. Ins., Hym., 34^{me} Fasc.,
pp. 37, 215.....1905.

Black; mouth, eyes broadly, tegulæ, anterior coxæ, and base of abdomen flavous, feet rufous; wings very short, hyaline, nervures black.

Length, 9-10 mm.

Antennæ about half the length of the abdomen, microscopically pilose; fuscous towards the base of the flagellum, the basal joint of the scape yellow on the underside. Head black; the mouth, mandibles, palpi, orbits (broadly on the inner, narrowly on the outer, side) and the face (except a triangular black mark), yellow; face and vertex finely punctured; the front transversely, and the head behind at the sides longitudinally and strongly, striated; an indistinct keel runs down from the ocelli and another from each antenna down the face.

Thorax black; a broad line on each side of the mesonotum in front close to the pronotum, the tegulæ and the scutellum in the center, yellow; mesonotum strongly transversely striated in front, punctured in the middle, aciculated behind; prothorax obliquely striated at the sides, except in the middle, which is shining and impunctate; pronotum roughly transversely striated; mesopleura (except below the wings) and sternum rugose; scutellum punctured, the lateral keels stout; metathorax coarsely reticulated. Abdomen twice the length of the head and thorax united; the greater part of the basal half yellow, fourth and fifth segments rufous; wings not half the length of the abdomen.

Legs reddish, the four anterior coxæ and trochanters yellow; the

* Not in the British Museum, but a MSS. states that it is "in the Vienna Museum."

hind coxæ and trochanters black, yellow at their junction, the base of the hind femora and apices of the tibia and tarsi black. In most of the specimens the hind femora and tibiæ incline to fuscous or black, perhaps owing to discoloration.

I have not seen a specimen of this species, and can only give Cameron's description.

Types.—♀ and ♂. Location unknown.*

Distribution.—The type was taken at Ciudad in Durango, Mexico.

***Ophiopterus coarctatus* Br.**

- Ophiopterus coarctatus* Brullé, Hist. Nat. Ins., Hym., Vol. IV, p.
 153, pl. 42, fig. 5, Guaratuba, Brazil.....1846.
 " " Dalla Torre, Cat. Hym., III, p. 180, listed..1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
 p. 37, n. 1, listed.....1905.

Black; antennæ with wide, dirty white band near the apex; four anterior tibiæ and tarsi in part, flavous.

Length, 23 mm.; ovipositor, 4 mm.

Black; head rugose or strongly punctured with the face a little projecting in the middle; antennæ with wide flavous annulus near the apex; prothorax rugose above and below; pro- and mesopleuræ punctured; median lobe of mesonotum punctured in front, projecting and compressed, behind rugose or transversely striated, edges of lateral lobes punctured, slightly projecting and pointing backward; mesopleuræ smooth in the middle, strongly punctured below; scutellum rugose, slightly enlarged behind; metathorax strongly rugose—"the arrangement of the wrinkles imitating small scales"—the second region represented by two semicircular lobes, raised at the edge.

Wings transparent, nervures black.

Four anterior legs mostly dirty white, the inner surface black or brown; tarsi partly brown; two anterior femora ferruginous; second and third segments of posterior tarsi whitish.

Abdomen compressed from the third segment on; valves of ovipositor arcuate, the posterior two-thirds a little enlarged.

I have not seen a specimen of this species, and can only give a translation of Brullé's description.

Type.—♀. Location unknown.

Distribution.—I find no reference to this species since the original description, the type of which was taken at Guaratuba, Brazil.

* Not in the British Museum, but a MSS. states that "Mr. Cameron retained the specimens."

Genus **ATHYREODON** Ashm.

<i>Athyreodon</i> Ashmead, Proc. U. S. Nat. Mus., No. 1206, p. 87, n. 645 (Vol. XXIII, 1901).....	1900.
“ Faun. Hawaiiensis, Vol. I, Part 3, p. 343.....	1901.
<i>Tipulophion</i> Kriechbaumer, Zeitschr. Hym. Dipt., I, p. 75, March 1.....	1901.
<i>Athyreodon</i> Ashmead, Faun. Haw., I, p. 343, August 1.....	1901.
“ Dalla Torre, Cat. Hym., III, p. 185.....	1901.
<i>Tipulophion</i> Schulz, Zeitschr. f. Syst. Hym. Dipt., III, p. 252.....	1903.
<i>Macrophion</i> Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 32.....	1905.
<i>Tipulophion</i> Schulz, Spolia Hym., p. 97, n. 186.....	1906.
<i>Macrophion</i> Schmiedeknecht, Opusc. Ichn., XVIII, p. 1420.....	1908.

Ocelli large, close to the tops of the eyes; wings without stigma; discocubital vein arcuate, not appendiculate; nervellus broken above the middle; antennæ long, filiform; claws pectinate.

Generic type.—*A. atriventris* Cress.

The members of this genus are closely related to those of *Thyreodon*, but may be readily recognized by their large ocelli. These vary slightly in size, but are always much larger than in *Thyreodon* and considerably larger than in *Ophion*. In some species the ocelli are close to each other and also to the tops of the eyes, almost filling this space; in others they are well separated from each but near the eyes. The other characters are as in *Thyreodon*. This difference from members of the Genus *Thyreodon* has been recognized by three different workers, and, strange enough, in the same species, *atriventris*, though none of the three recognized this fact; each proposed a new genus and described his species as new. It will, therefore, be readily seen that there is some variation within this species. The size of the fuliginous spots in the wings varies, at least in *atriventris*, and probably in other members of the genus, but how widely is not known. Dalla Torre's statement that *Athyreodon* is mentioned in the Transactions of the Entomological Society of London, p. 87, 1900, is a mistake, and he evidently confused it with the Proceedings of the U. S. National Museum, No. 1206, p. 87, 1900.

Distribution.—The members of this genus are apparently tropical with a wide distribution from Mexico to southern Brazil, including the West Indies. *A. atriventris* ranges over

all of this territory, but so far as is now known the others have a more restricted distribution.

The species which compose this genus are large, bright colored insects, conspicuous in any collection. Nothing is known of their life history, habits or hosts, but these probably differ but little from those of the closely related *Thyreodons*.

Table of Species.

1. Flagellum of antennæ and abdomen black, with or without cyaneous reflection.....2.
- Flagellum of antennæ and abdomen *not* black.....4.
2. Legs and mesonotum entirely black.....**fenestratus** Tasch.
Legs and mesonotum *not* entirely black, four anterior legs more or less flavous.....3.
3. Wings with apical fuliginous band in both.....**apicalis** Szep.
Wings with apical fuliginous band, radial and median cells more or less black.....**atriventris** Cress.
4. Apex of wings fuscous.....**fulvescens** Cress.
Part of radial and marginal cells and stripe along basal vein black.
armstrongi n. sp.

***Athyreodon fenestratus* (Tasch.).**

- Ophion fenestratus* Taschenberg, Zeitschr. f. d. Ges. Natur., 46,
p. 425, n. 4, ♀1875.
“ “ Dalla Torre, Cat. Hym., III, p. 1901901.
Macrophion fenestratus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 33, n. 1, pl. 2, fig. 13.....1905.
Thyreodon “ Szepligeti, Idem, p. 25, n. 7.....1905.
Macrophion “ Schulz, Spolia Hym., p. 97.....1906.

Cyaneous; mesonotum and abdomen black with a bluish reflection; mesopleuræ and pectus sanguineous. wings fulvoferruginous with a large subhyaline nearly transparent spot in the discocubital and discoidal cells.

Length, 26-30 mm

Eyes and ocelli large; antennæ black; frons and clypeus densely and finely punctured; frons rugose, with a median keel extending below the base of the antennæ; clypeus rounded in front.

Thorax smooth and shining; mesonotum and metathorax black; mesopleuræ, mesosternum and sometimes the metapleuræ sanguineous; mesonotum with parapsidal furrow distinct; metathorax rugose. Wings fulvofuscous, with a large subhyaline almost transparent spot in the discocubital and discoidal cells; nervulus postfurcal to interstitial, nervellus broken well above the middle; discocubital vein arcuate, stigma lacking. Legs black. Abdomen black, with a cyaneous reflection, strongly compressed.

I have not seen a specimen of this species, and can only give a free translation of the original description with additions from Szepligeti's description.

Type.—♀. Location unknown to me.

This species was first described as *Ophion fenestratus* by Taschenberg from a female from Rio de Janeiro, and later re-described as *Macrophion fenestratus* Szepligeti, a supposedly new species, from a male from Espirito Santo, Brazil. Mr. W. A. Schulz treats *M. fenestratus* Szep. and other male specimens of this species as "the hitherto unknown males of *Tipulophion rufithorax*" (*A. atriventris*), but this is apparently a mistake, for they agree with the female of *fenestratus*, while the difference from *A. atriventris* is quite marked.

Distribution.—Rio de Janeiro, Espirito Santo, Brazil.

Athyredon apicalis (Szep.).

Macrophion apicalis Schmiedeknecht, Opusc. Ichtn., XVII, p.

1420.....1908.

Ferruginous; vertex, antennæ and posterior legs black; abdomen bluish-black; wings, apical third of the anterior wing and apex of the posterior brown.

Length, 30 mm.

Type.—♀.

I have not seen a specimen of this species, and can give only a translation of the unfortunately incomplete original description. It is apparently closely related to *T. spectabilis*, and can from our present knowledge only be distinguished from it by the larger ocelli which place it in another genus.

Distribution.—Peru.

Athyredon atriventris (Cress.).

Ophion atriventris Cresson, Proc. Acad. Nat. Sci. Phila., p. 374,

n, 4, ♀, Mexico1873.

Thyreodon rufithorax Cameron, Biol. Centr. Amer., Hym., I, p.

290, n. 7, ♀, pl. 12, p. 15, Panama, Bugaba, 800 to 1,500 feet.....1886.

Athyredon thoracicus Ashmead, Proc. U. S. Nat. Mus., No. 1206,

p. 87 (Vol. 23).....1900.

Tipulophion gigas Kriechbaumer, Zeits. f. Syst. Hym. Dipt., I,

p. 761901.

Athyredon thoracicus Dalla Torre, Cat. Hym., III, p. 185.....1901.

Thyreodon rufithorax Dalla Torre, Idem, p. 186.....1901.

- Ophion atriventris* Dalla Torre, Idem, p. 188.....1901.
Tipulophion rufithorax Schulz, Zeits. f. Syst. Hym. Dipt., III,
 p. 249.....1903.
Thyreodon rufithorax Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
 25, n. 20.....1905.
Ophion atriventris Szepligeti, Idem, p. 31, n. 90.....1905.
Macrophion ornatus Szepligeti, Idem, p. 33, n. 2, ♀, pl. 2, fig. 17..1905.
Tipulophion rufithorax Schulz, Spolia Hym., p. 97,.....1906.
Macrophion ornatus Schmiedeknecht, Opusc. Ichn., XVIII, p.
 420.....1908.

Thorax fulvous; flagellum of antennæ and abdomen black; wings hyaline, with the radial and more or less of the median and cubital cells dark fuliginous; metathorax coarsely reticulate.

Length, 29-33 mm.; wing, 23-26 mm.; spread, 48-55 mm.; antennæ, 22-23 mm.

Head with vertex and flagellum of antennæ black; scape fulvo-ferruginous; ocelli large and prominent, entirely filling the space between the tops of the eyes; eyes large, emarginate; face narrow; clypeal foveæ distinct.

Thorax flavous to dark fulvous, smooth and shining except on the mesonotum and scutellum which are finely punctured; mesonotum with deep parapsidal furrows converging toward the base of the scutellum; metathorax somewhat rounded behind and very coarsely reticulated.

Wings hyaline, with radial and more or less of the cubital cells dark fuliginous, stigma lacking; nervulus postfurcal to interstitial; nervellus broken well above the middle; discocubital vein arcuate.

Legs with posterior coxæ and trochanters, and the four anterior legs except the feet and intermediate tarsi, flavous; the rest black.

Abdomen smooth and shining, black with a bluish reflection, sometimes with a slight reddish ground color showing through.

In describing this species I have examined the types of *A. thoracicus* Ashm. and *atriventris* Cress., comparing them and one other specimen with the various descriptions.

Type.—♀. No. 71, American Entomological Society.

This distinct species is easily recognized by the contrasting colors of the body, but owing to variation in the color of the thorax, and the extent of fuliginous in the wings, it has been described with several different species and confused with related forms. The thorax is normally light fulvous, but occasionally has a slight reddish tinge and is rarely ferruginous. The amount of fuliginous in the wings varies

from a condition where all of the median and most of the radial and cubital cells are of this shade, to a state where it is only present as a narrow band along the basal vein, while in the radial and cubital cells the bases or even the whole cubital cell may be hyaline. In the types of *A. atriventris* the median and radial cells are fuliginous; in the type of *Tipulophion gigas* the radial, base of the cubital and the median except a median longitudinal hyaline stripe, are fuliginous; in the type of *T. rufithorax* the fuliginous occupies the radial cell, except the base, and forms a long band along the basal vein. *T. spectabilis* is related to *atriventris*, for they agree in size and color of the body, but in the former the eyes are small and narrow, the metathorax finely striate, not coarsely reticulate and the whole apex of the wing is fuliginous.

An examination of the type of *A. thoracicus* satisfies me that it is a synonym of *A. atriventris* Cress.; the description of *Tipulophion gigas* and the descriptions and colored plates of *Macrophion ornatus* Szep. and *Thyreodon rufithorax* Cam. show that they are also synonymous. Mr. W. A. Schulz states that *Macrophion fenestratus* Szep. is the hitherto unknown male of *A. atriventris* (*T. rufithorax*), but this is evidently a mistake, for *Macrophion fenestratus* is synonymous with *Athyreodon fenestratus* Tasch.

Distribution.—This species apparently ranges from Mexico to southern Brazil. It has been reported from Orizaba, Mexico; Honduras; Costa Rica, Volcan de Chiriqui at 7,000 feet, etc.; Bugaba, Panama, 8 to 1,500 feet; Brazil, Orobo in Bahia, Theresapolis in Santa Catharina, Rio de Janeiro, Rio Grande do Sul.

Nothing is recorded of the life history, habits or hosts.

Location of specimens.—American Entomological Society, type ♀, No. 71, Mexico. Massachusetts Agricultural College, homotype, ♀, Chiriqui. U. S. National Museum, type of *thoracicus* Ashm. British Museum.* Munich State Museum,

* The type of *Thyreodon rufithorax* Cam. is not in the British Museum, and may have been retained by Mr. Cameron or deposited in the Vienna Museum with some of his other material.

type of *Tipulophion gigas* Kriech. Strassburg Zoological Museum, Honduras; Brazil, Orobo in Bahia, Theresapolis in Santa Catharina.

Athyreodon fulvescens (Cress.).

<i>Thyreodon fulvescens</i>	Cresson, Proc. Ent. Soc. Phila., IV, p. 46,	
	♂, Cuba	1865.
"	" Ashmead, Proc. Ent. Soc. Lond., p. 354.....	1900.
"	" Dalla Torre, Cat. Hym., III, p. 185.....	1901.
"	" Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p.	
	25, n. 9.....	1905.

Fulvous; antennæ fulvous; ocelli large; wings hyaline to fulvous with the apex fuscous, basal half of second abdominal segment black above.

Length, 25-27 mm.; wing, 17-18 mm.; spread, 36-39 mm.; antennæ, 17 mm.

Reddish-brown coated with yellowish pubescence; face, eyes, back of head and mandibles, except the tips, yellow; vertex and ocelli flavous; ocelli large, eyes slightly emarginate, tinged with ferruginous; antennæ two-thirds the length of the body; clypeal foveæ deep, clypeus with a distinct point, surmounted by a median prominence; thorax smooth and shining or finely and indistinctly punctured; mesonotum with deep parapsidal furrows converging toward the scutellum; pleuræ smooth and shining; scutellum tinged with yellow; meta-thorax opaque, flat behind, and indistinctly rugose; more coarsely reticulate on the sides; median furrow shallow.

Wings hyaline to bright flavous, with the apex fuscous; stigma lacking; discocubital vein arcuate, nervulus interstitial, nervellus broken above the middle; first recurrent vein one-half the length of the second; legs fulvous, tibiæ and tarsi slightly paler; abdomen elongate, strongly compressed, smooth and shining; the basal half of the second segment black above; anal valves long (2 mm.), slender and obtusely pointed.

In describing this species I have examined the type ♂.

Type.—♂. No. 69, American Entomological Society.

Athyreodon armstrongi n. sp.

Fulvo-ferruginous; dorsum of second abdominal segment black; wings hyaline, with most of the radial cell and a band along the basal vein black.

Length, 37 mm.; wing, 26 mm., spread, 56 mm.; antennæ, 25 mm.

Fulvo-ferruginous, closely and densely punctured; vertex of the general color; ocelli large, somewhat separated, but almost filling the

space between the tops of the eyes, a median ridge running from the anterior to or slightly below the deep, bordered antennal fossæ; eyes emarginate, large, reaching almost to the base of the mandibles; clypeus bluntly pointed, clypeal foveæ deep; mandibles broad, stout, punctured.

Thorax shining, fulvo-ferruginous; thoracic sutures and parapsidal furrows distinct, more or less crenulated; metathorax very coarsely and irregularly reticulate throughout, with small but distinct protuberances at the anterior margin, one in the middle and one on each side.

Wings hyaline, the anterior with the apical two-thirds of the radial cell, a spot in the upper basal third of the cubital cell and a stripe along the basal vein, black; the median cell is slightly infuscated, suggesting that, in some specimens, it may be black; nervulus interstitial, nervellus broken far above the middle, near the cubital vein.

Legs smooth and shining, dark fulvous, sometimes more or less fuscous. Abdomen ferruginous, not very strongly compressed; apex of the first segment and dorsum of the second black, the rest slightly tinged with fuscous.

Described from one male specimen.

Type.—♂. U. S. National Museum.

I have named this species in honor of Mr. A. H. Armstrong, a worker on Hymenoptera whose untimely death has undoubtedly prevented valuable contributions to our knowledge of this group.

Distribution.—San Francisco Mountains, Santo Domingo, West Indies, September.

Genus **THYREODON** Br.

- Thyreodon* Brullé, Hist. Nat. Ins. Hym., IV, p. 150, November..1846.
 " Cresson, Proc. Acad. Nat. Sci., Phila., p. 375 (January, 1873)1874.
 " Taschenberg, Zeitschr. f. d. Ges. Natur., 46, p. 425....1876.
 " Provancher, Faun. Ent. Can., Hym., IV, p. 352.....1883.
 " Cameron, Biol. Centr. Amer., Hym., I, p. 2881886.
 " Ashmead, Smith's Ins. N. J., p. 580.....1900.
 " " Trans. Ent. Soc. Lond., pp. 270, 354.....1900.
 " " Proc. U. S. Nat. Mus., No. 1206, pp. 87, 188 (Vol. XXIII, 1901). Classification of Ichneumon Flies.....1900.
 " Dalla Torre, Cat. Hym., III, p. 185.....1901.
Tipulophion Kriechbaumer, Zeitschr. Hym. Dipt., I, p. 75.....1901.
Aglaophion Cameron, Journ. Straits Branch Soc., p. 131.....1903.
Thyreodon Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 25.....1905.
 " Schmiedeknecht, Opusc. Ichn., XVIII, p. 1418.....1908.

Ocelli small, separated from the tops of the eyes by about twice their diameter; wings without stigma; discocubital vein arcuate, not appendiculate; nervellus usually broken well above the middle; nervulus usually postfurcal to interstitial; claws pectinate; abdomen compressed.

Generic type.—*T. cyaneus* Br.

The species of this genus are large, often bright colored insects, usually more or less extensively marked with black on both body and wings. They are closely related to members of the Genus *Athyreodon*, but may be recognized by their small ocelli. The Ophions may be readily distinguished by the presence of a stigma, discocubital vein usually angularly broken and appendiculate, nervellus usually broken below the middle and the wings usually hyaline, while the ocelli are usually larger. A few species, however—*O. costale*, *bifoveolatus*, etc.—sometimes at least, have these characters as in *Thyreodon* except for the presence of a distinct stigma. These specimens are always smaller than the *Thyreodons*, and the wings are not distinctly marked with black.

The Genus *Thyreodon* was proposed by Brullé in 1846 for three strictly American species—*T. cyaneus*, *morio* and *marginipennis*. The generic type was not designated and, so far as I can learn, has not yet been. I therefore designate *T. cyaneus* Br. as the generic type, in accordance with the International Code of Nomenclature, Recommendations, Art. 30, Sect. N, as revised by the Seventh Congress; by which preference is given to the best described, best known, etc. *T. cyaneus* was the first described—by Brullé, was well known at the time and a good colored plate was given. Taschenberg mentions the Genus *Thyreodon* in 1876, but considers it synonymous with the Genus *Ophion*. All later writers have, however, considered it valid.

Distribution.—This genus includes about twenty species and subspecies of which all but two, one from Japan and one from Borneo, are American. The American species are with a few exceptions tropical, but *T. morio* ranges as far north as Quebec and Stonewall, Canada, and *T. marginipennis* comes from Uruguay and Argentina. *T. morio* and *laticinctus*

are perhaps the most widely distributed, the former ranging from southern Canada to Central America, and the latter apparently from Central Mexico to Peru.

Variation.—Members of this genus show some variation in color, especially in the amount of black. This is well brought out in *T. morio* and its subspecies *transitionalis* where the head and legs are sometimes more or less flavous or tinged with ferruginous. This variation is somewhat similar to that seen in *A. atriventris*, but the limits are not yet known, and *T. snowi* may prove to be a continuation of this. The violet-blue reflection seen in *T. cyaneus* and *T. grandis* may also prove to be simply variation, but breeding experiments are needed to settle these questions.

Economic importance.—The value of the members of this genus as parasites can not be estimated, for most of them are tropical and their hosts are unknown. So far as known, however, they are parasitic upon Spingidæ.

Life history and habits.—Little is known of the life history or habits of the members of this genus, but that of *T. morio* is probably typical, and this, so far as known, is given under that species.

Table of Species.

1. Wings *entirely* black, with or without cyaneous reflection.....2.
Wings *not entirely* black, with or without cyaneous reflection ...13.
2. Body *entirely* black, with or without cyaneous reflection.....3.
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3. Antennæ *entirely* black4.
Antennæ *not entirely* black.....6.
4. Body and wings *with* a distinct cyaneous reflection.....5.
Body *without* a distinct cyaneous reflection.....**niger** Cress.
5. Face and thorax *with* dense pubescence...**nigro-cæruleus** Cam.
Face and thorax *without* dense pubescence.....**cyaneus** Br.
6. Antennæ yellowish-white, with base and apex black.
morosus Sm.
Antennæ not yellowish-white.....7.
7. Antennæ black, flavous below.....**niger** Cress.
Antennæ flavous or orange flavous (reddish), base and apex
sometimes black.....8.
8. Body and wings *with* distinct cyaneous reflection..**grandis** Cress.
Body and wings *without* distinct cyaneous reflection.....21.
9. Abdomen fulvous, slightly marked with black.....**affinis** Cress.
Abdomen *not* fulvous.....10.

10. Abdomen black, with median transverse band of some other color11.
 Abdomen more or less black, *without* median transverse band of some other color.....12.
11. Abdomen with median transverse band of lemon-yellow.
 laticinctus Cress.
 Abdomen with median transverse band of ferruginous.
 zonatus Szep.
12. Thorax and abdomen entirely black.....**morio** Fabr.
 Thorax and first abdominal segment ferruginous.
 ferrugineus n. sp.
13. Abdomen flavous or flavo-ferruginous, marked with black.....14.
 Abdomen black or mostly black.....15.
14. Metathorax very finely reticulate.....**ornatipennis** Cress.
 Metathorax coarsely reticulate.....**elegans** Cress.
15. Thorax partly or entirely fulvous to ferruginous16.
 Thorax entirely black.....18.
16. Flagellum of antennæ *black*.....17.
 Flagellum of antennæ *fulvous*.....**snowi** Vier.
17. Wings fulvo-hyaline, apex black.....**spectabilis** Perty.
 Wings hyaline with radial, submarginal and part of the second apical cells black**grenadensis** Ashm.
18. Antennæ with flagellum black.....19.
 Antennæ with flagellum fulvous or orange-fulvous.....11.
19. Wings black, with a purplish reflection and a hyaline spot in the discocubital and discoidal cells.....**maculipennis** Cress.
 Wings entirely flavo- or fulvo-ferruginous.....20.
20. Face strongly rugose.....**marginipennis** Br.
 Face punctate, not rugose.....**flammipennis** Ashm.
21. Abdomen black, with median transverse band of ferruginous.
 fernaldi n. sp.
22. Face and legs more or less fulvous...**morio transversalis** Vier.
 Face and legs shining black.....23.
23. Antennæ orange-fulvous, mesopleuræ punctured ...**morio** Fabr.
 Antennæ red, mesopleuræ not punctured....**erythrocerus** Cam.

Thyreodon niger Cress.

- Thyreodon niger* Cresson, Proc. Acad. Nat. Sci. Phila., p. 375,
 n. 1, ♀ ♂.....1873.
- “ “ Cameron, Biol. Centr. Amer., Hym., I, p. 288,
 pl. 12, fig. 12.....1886.
- “ “ Dalla Torre, Cat. Hym., III, p. 186.....1901.
- “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 25,
 n. 17.....1905.

Black; wings with a cyaneous reflection; antennæ black.

Length, 25-35 mm.; wing, 15-26 mm.; spread, 32-54 mm.; antennæ, 12-23 mm.

Black, with very fine short sparse pubescence; head and thorax densely punctured; head slightly narrowed behind the eyes, closely and deeply punctured; ocelli small, distant from the top of the eyes; vertex more or less distinctly reticulate; eyes large, emarginate; antennæ black, sometimes tinged with flavous beneath or the apex of the segments slightly reddish, with a more or less distinct ridge extending from the anterior ocellus down between the bases of the antennæ as in *morio*; clypeal foveæ deep, mandibles broad and stout. Thorax entirely black, densely punctured except on the mesopleuræ; thoracic sutures distinct, often crenulate; mesonotum opaque, with deep crenulated parapsidal furrows; mesopleuræ smooth and shining except on the edges, where it is sparsely punctured; metathorax opaque, flat behind, finely rugose.

Wings black with steel-blue reflection; stigma lacking; discocubital vein arcuate; nervulus interstitial; nervellus broken well above the middle; legs black, claws pectinate; abdomen black, smooth and shining, or at the most very finely punctured, with fine short scanty pubescence, in one specimen the third segment is slightly tinged with red, ovipositor red.

Redescribed from the types and three specimens compared with the original description.

Types.—♀ and ♂. No. 65, American Entomological Society.

This species is related to *T. morio*, but may be readily recognized by the steel-blue wings and entirely black antennæ.

It is more closely related to *T. cyaneus* and may prove to be synonymous, but the absence of purplish reflection seems fairly constant.

Distribution.—Mexico; Guatemala.

The exact range of this species is not yet well known, but it seems to range through Mexico and Central America. It has been reported from Cordova, etc., Mexico; and Cubilguitz in Vera Paz, Guatemala, and I have seen specimens from Alta Mira, Tamaulipas, and Cuernavaca, Mexico.

Nothing is known of the life history, habits, or hosts; three specimens before me were taken June 26 and July 4.

Location of specimens.—American Entomological Society,

♀ and ♂, types No. 65, Mexico. U. S. National Museum, ♀, Cuernavaca, Mexico. Massachusetts Agricultural College, ♀ and ♂, homotypes, Alta Mira, Mexico, VI, 26.

Thyreodon nigro-cæruleus Cam.

Thyreodon nigro-cæruleus Cameron, Journ. Royal Agr. and Commer. Soc., British Guiana, I, p. 180..1911.

"Length, 27 mm.

"Black, tinged with blue on the pleuræ and metanotum; wings uniformly fuscous-violaceous, the nervures and stigma black. Face covered with pale, the thorax more densely with longer black pubescence, which is longest on the scutellum. Head and thorax closely punctured, the center of the scutellum smoother than the sides. The sides of the metanotum finely, sparsely punctured, the center raised, irregularly longitudinally reticulated; the top of the slope finely, obliquely striated, the striæ interlacing; the sides below are more strongly obliquely striated, smooth on the inner side; the central furrow is strongly, not very closely, transversely striated. Metapleuræ closely finely obliquely striated. Front broadly raised between the antennæ and ocelli, the sides depressed, the depression narrowed above, the bottom, except at the top, finely, closely striated. Female.

"Apex of clypeus transverse, its sides broadly rounded. Sides of scutellum keeled to shortly beyond the middle."

This is evidently closely related to *T. cyaneus* Br., and may be a synonym for it is based on only one specimen, and the long pubescence on the face and scutellum may be abnormal.

Distribution.—British Guiana.

Location of specimens.—Georgetown Museum, Brit. Guiana.

Thyreodon cyaneus Br.

Ophion morio Spinola, Ann. Ent. Soc. Fr., IX, p. 168, n. 22, ♀
(non Fabr.).....1840.

Thyreodon cyaneus Brullé, Hist. Nat. Ins. Hym., IV, p. 151, n.
1, ♀ ♂, pl. 42, fig. 3.....1846.

Ophion cyaneus Taschenberg, Zeitschr. f. d. Ges. Natur., 46, p.
425, n. 1.....1875.

Thyreodon cyaneus Dalla Torre, Cat. Hym., III, p. 1851901.

" " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 25,
n. 4.....1905.

" *intermedius* Szepligeti, Ann. Hist. Nat. Mus. Nat.
Hung., IV, Part 1, p. 133, Obidos,
Brazil.....1906.

Cyaneous, antennæ black, wings with brilliant blue reflection.

Length, 27-34 mm. ; wing, 16-18 mm. ; spread, 34-40 mm. ; antennæ, 14-20 mm.

Cyaneous ; head opaque ; ocelli small, distant from tops of eyes ; eyes large, emarginate ; antennæ black, much shorter than body ; clypeal foveæ distinct ; thorax and abdomen cyaneous ; thoracic sutures deep, crenulated ; mesonotum opaque, slightly pubescent and punctate, with two more or less pronounced tubercles on the anterior edge ; parapsidal furrows deep and crenulated, often with one or more parallel carinæ on the median lobe ; metapleuræ smooth and shining or punctate around the edge ; metathorax finely rugose-striate with a distinct median furrow.

Wings black with bright purplish-blue reflection ; stigma lacking ; discocubital nervure arcuate ; nervulus interstitial to antefurcal ; nervellus broken well above the middle ; legs with claws pectinate ; abdomen smooth and shining with short sparse pubescence ; stigmata quite pronounced ; ovipositor reddish.

In describing this species I have compared ♀ and ♂ specimens with the original description.

Type.—♀ and ♂. Location unknown.

Distribution.—Brazil ; Dutch Guiana.

This species was described by Brullé from specimens taken at Cayenne, Caternaut ; Brazil (Capit des Mines) ; and I have before me specimens from Surinam, Dutch Guiana.

Nothing is known of the life history, habits or hosts.

Location of specimens.—British Museum. Massachusetts Agricultural College, ♀ and ♂, Surinam, Dutch Guiana.

Thyreodon morosus Sm.

Thyreodon morosus Smith, Descr., New Spec. Hym., p. 230, n. 1,

	♀	1879.
"	" Cameron, Biol. Centr. Amer., Hym., 1, p. 289,	
	n. 3.....	1886.
"	" Dalla Torre, Cat. Hym., III, p. 186.....	1901.
"	" Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p.	
	25, n. 16.....	1905.
"	<i>pulchricornis</i> Szepligeti, Ann. Hist. Natur. Mus. Nat.	
	Hung., IV, p. 133, Marcapata, Peru.....	1906.

Black ; wings dark brown with violet-purple reflection ; antennæ white to yellowish-white with base and apex black.

Length, 23-33 mm. ; wing, 16-24 mm. ; spread, 34-51 mm. ; antennæ, 15-20 mm.

Black ; vertex and frons more or less reticulate, with a minute median

tubercle below the bases of the antennæ and two diverging carinæ running back from it towards the ocelli; ocelli small, distant from the tops of the eyes; eyes large, emarginate; antennæ white or yellowish-white with the base and apex black; face closely punctured, clypeal foveæ deep.

Thorax opaque, densely punctured to granulose, except the mesopleuræ, which are shining, very finely and sparsely punctured; mesonotum with deep, crenulated parapsidal furrows uniting behind; metathorax finely rugose-striate, with a distinct median furrow.

Wings dark brown to black with a brilliant violet-purple reflection; discocubital vein arcuate; nervulus interstitial; nervellus broken well above the middle; legs black, claws pectinate; abdomen smooth and shining, with an obscure violet reflection.

In describing this species I have compared one ♀ and two ♂ specimens with the original description.

Type.—♀. British Museum.

This species somewhat resembles *T. morio* and *grandis*, but is much more slender and easily recognized by the whitish antennæ.

Distribution.—This species ranges from Costa Rica to southern Brazil; it has been reported from Cache, Costa Rica. Szepligeti's specimen came from Marcapata, Peru, and I have before me specimens from San Carlos, Costa Rica, and Rio Grande do Sul, Brazil.

Location of specimens.—British Museum, type ♀, Costa Rica. U. S. National Museum, ♂, San Carlos, Costa Rica. Massachusetts Agricultural College, ♀ and ♂, Rio Grande do Sul, Brazil. Hungarian Natural History Museum, ♀ and ♂ types of *T. pulchricornis* Szep., Marcapata, Peru.

Thyreodon grandis Cress.

<i>Thyreodon grandis</i>	Cresson, Proc. Ent. Soc. Phila., IV, p. 45,	
	Cuba	1865.
" "	Cameron, Biol. Centr. Amer., Hym., I, p. 289.	1886.
" "	Ashmead, Proc. Ent. Soc. Lond., p. 354.	1900.
" "	Dalla Torre, Cat. Hym., III, p. 185	1901.
" "	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 185,	
	n. 10	1905.

Black; antennæ fulvous, wings deep violaceous.

Length, 22–34 mm.; wing, 19–23 mm.; spread, 42–48 mm.; antennæ, 18–22 mm.

Head entirely black; face finely and densely punctured; ocelli small; eyes black, flecked with fulvo-ferruginous, slightly emarginate; antennæ fulvous, darker at apex; basal joint sometimes black, two-thirds the length of the body; clypeal foveæ deep.

Thorax finely and densely punctured; middle of mesonotum and mesopleuræ shining, anterior margin of the mesonotum with a small protuberance on each side; parapsidal furrows converging towards the scutellum and confluent slightly beyond the middle, forming a Y-shaped groove, each containing a more or less distinct carina; scutellum convex, densely punctured, deeply excavated in front and with a well-defined carina on each side; metathorax opaque-black, finely pubescent, flat, only slightly excavated behind, with a shallow median furrow, and sometimes quite strongly contracted at the base; finely and longitudinally striated behind, the sides more coarsely; in one specimen the metathorax is finely reticulated all over.

Wings uniformly dark fuscous, with brilliant violaceous reflection; in some specimens the apical margins lack this reflection; nervulus interstitial or nearly so; nervellus broken well above the middle; legs and abdomen smooth, shining black.

Abdomen impunctate, rather broad and compressed; basal segment the longest and swollen at the apex, the second segment one-fourth shorter, gradually broader towards the tip, with a shallow longitudinal furrow on the basal half of each side; third segment shorter than the second and slightly longer than broad, the remaining segments broader than long.

In describing this species I have compared the cotypes and one female specimen with the original description.

Cotypes—Two ♀ and one ♂. American Entomological Society.

This distinct species is easily recognized by the brilliant reflection of body and wings. Mr. Cresson states that "in the male the wings are not so dark, the apical margins being subhyaline, and the violaceous reflection not so deep." I find, however, that this condition appears frequently in the female, and is apparently a minor variation common to both sexes.

T. erythrocerus Cameron is possibly synonymous with this species, but as I have not seen the type I am unable to say definitely. *T. morio*, *morosus*, *niger* and *cyaneus* are also related, but may be readily separated; *morio* by its dull black body and wings, and stouter body; *morosus* by its yellowish white antennæ and more slender body; *cyaneus* and *niger* by their black antennæ.

Distribution.—Santiago de Cuba, Cuba.

Location of specimens.—American Entomological Society, two ♀ and one ♂ cotypes, No. 72, Cuba. American Museum of Natural History, ♀, homotype, Santiago de Cuba, Cuba. U. S. National Museum, Cuba. British Museum, ♀, type of *T. erythrocerus* Cam., Valladolid in Yucatan.

***Thyreodon affinis* Cress.**

<i>Thyreodon affinis</i>	Cresson, Proc. Ent. Soc. Phila., IV, p. 46.....	1865.
" "	Ashmead, Trans. Ent. Soc. Lond., p. 354.....	1900.
" "	Dalla Torre, Cat. Hym., III, p. 185	1901.
" "	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 25, n. 3.....	1905.

Fulvous or honey-yellow; tip of antennæ and base of second abdominal segment blackish; wings fuscous, with a violaceous reflection.

Length, 42 mm.; wing, 16 mm.; spread, 36 mm.

Fulvous or honey-yellow, shining, clothed with a very short, yellowish pubescence, more obvious when viewed laterally; eyes paler, antennæ fulvous, the apical joints brown varying to black, two-thirds the length of the body; mandibles tipped with blackish.

Thorax indistinctly punctured; the mesonotum with parapsidal furrows broad and deep, with a subobsolete elevated line down the middle of each groove; mesopleuræ polished; scutellum convex, deeply excavated in front, with a carina on each side acutely developed; metathorax abruptly sloped behind, with a broad shallow median furrow becoming deeper towards the insertion of the abdomen where the surface is longitudinally striated, the remainder of the surface indistinctly sculptured; wings dark fuscous, with a violaceous reflection, more obscure on the apical margin; nervures blackish; legs of the color of the body.

Abdomen elongate, falcate, the apical segments compressed but not very broad, the basal half of the second segment above black; anal processes broad, obliquely pointed at the tips, which are acute.

I have not seen the type of this species, and can only give the original description, slightly modified for simplicity.

Type.—♂. Caja No. 93, Instituto de Segunda Enseñanza de la Habana, Cuba.*

Distribution.—Cuba.

* Mr. Wm. T. Horn writes that at the time he saw this type on May 22, 1909, it appeared to be in a good state of preservation, in a small cigar box with a glass face—Caja No. 93. This with the rest of the Gundlach collection is now in the Instituto de Segunda Enseñanza de la Habana, located on Obispo Street (in the first block above the palace), Dr. Cañizares director.

Thyreodon laticinctus Cress.

<i>Thyreodon laticinctus</i>	Cresson, Proc. Acad. Nat. Sci. Phila., p. 376, n. 3, ♀, Mexico.....	1873.
“ <i>principalis</i>	F. Smith, Descr. New Spec. Hym., p. 230, n. 2, ♀, Costa Rica, C. M.....	1879.
“ <i>laticinctus</i>	Cameron, Biol. Centr. Amer., Hym., I, p. 289, pl. 12, fig. 14.....	1886.
“ “	Dalla Torre, Cat. Hym., III, p. 185	1901.
“ <i>principalis</i>	Dalla Torre, Idem, p. 186.....	1901.
“ <i>laticinctus</i>	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 25, n. 12.....	1905.
“ <i>principalis</i>	Szepligeti, Idem, p. 25, n. 19.....	1905.
“ <i>laticinctus</i>	Schulz, Spolia Hym., p. 97, n. 185.....	1906.

Black; third and fourth abdominal segments lemon-yellow; wings with a brilliant purplish reflection.

Length, 24–33 mm.; wing, 18–24 mm.; spread, 38–48 mm.; antennæ, 15–20 mm.

Head, thorax and legs coated with fine black pubescence; ocelli small, distant from the tops of the eyes, varying in color from flavous or flavous with an outer band of black, to entirely black; eyes large, slightly emarginate, face deeply punctured.

Thorax dull black, except the mesopleuræ which are polished; mesonotum slightly shining, parapsidal furrows shallow, broad, opaque, finely reticulate to rugose, ending in two small, sometimes indistinct protuberances at the anterior border; metathorax clothed with dense, short pubescence, flat or only shallowly excavated behind with a distinct median furrow.

Wings black with brilliant purplish reflection; nervulus interstitial; nervellus broken somewhat above the middle.

Legs black, sparsely pubescent and shining.

Abdomen polished, black, except the third and the greater part of the fourth segments which are lemon-yellow; basal segment slightly dilated at the apex; genital valves of male abruptly sharply pointed.

In describing this species I have compared the type and four specimens with the original description.

Type.—♀. No. 73, Mexico, American Entomological Society.

This distinct species may be readily recognized by the lemon-yellow band on the abdomen. There is no reason to doubt that *T. principalis* Smith is synonymous. *T. zonatus* Szep. is also closely related, but in that species the abdominal band is ferruginous (gelbroth) not lemon-yellow. This may prove to be a subspecies of *laticinctus*, for Cameron's

plate of the latter shows the plate on the abdomen colored ferruginous, and the distribution corresponds.

Distribution.—This species ranges from Orizaba, Mexico, at 19° to below the equator at Chauchamayo, Peru. It has been taken at Chiriqui and Orizaba, Mexico; in Guatemala, at Zapote and Senahu; in Honduras; in Panama, at Chiriqui; in Colombia at Canauche, in the State of Cundinamarca, etc.; in Peru at Chauchamayo and in Costa Rica.

Location of specimens.—American Entomological Society, ♀ type, No. 7, Mexico, end of abdomen gone. U. S. National Museum, two ♀'s, Chauchamayo, Peru; Mexico. British Museum, ♀ type of *T. principalis* Sm. and specimens. Massachusetts Agricultural College, ♀ and ♂, homotypes, Colombia; Chiriqui, Panama.

***Thyreodon zonatus* Szep.**

Thyreodon zonatus Szepligeti, Ann. Hist. Natur. Mus. Nat. Hung.,
IV, p. 1341906.

Black; wings brown; the third and fourth abdominal segments ferruginous.

Length, 35 mm.

Black; head smooth, not enlarged behind the eyes; face, frons and vertex rugose; antennal fossæ not bordered; mesopleuræ smooth; metathorax rugose behind, sides coarsely rugose, median furrow shallow, wings brown; nervulus interstitial; nervellus broken above the middle; abdomen with the third and fourth segments ferruginous (gelbroth), the second segment shorter than the first.

I have not seen a specimen of this species, and can only give a free translation of the original description somewhat rearranged.

Types.—♀ and ♂. Hungarian National Museum.

This species is closely related to *T. laticinctus* and may prove to be synonymous, but Szepligeti distinguishes it by "the mesonotum in the latter—*laticinctus*—being armed in front with two horny protuberances, while the fourth abdominal segment is not entirely ferruginous (gelbroth) and the scutellum is bordered at the sides." The protuberances on the mesonotum of *laticinctus* are quite inconstant, but the color of the abdominal band is lemon-yellow, not ferruginous.

ous. However, since Cameron's colored plate of *laticinctus* shows the third and fourth abdominal segments ferruginous this variation may be fixed, and I therefore preserve this species. The difference in color may possibly be due to the specimen having been placed in a wet cyanide jar.

Distribution.—Juntas, Bolivia.

Thyreodon morio (Fabr.).

Plate III, fig. 21.

<i>Ichneumon morio</i>	Fabricius, Spec. Ins., I, p. 436, n. 100.....	1781.
“ “	“ Mant. Ins., I, p. 269, n. 118.....	1787.
“ “	Gmelin, Linné. Syst. Nat., ed. 13, I, p. 2709, n. 182.....	1790.
“ “	Olivier, Ency. Meth. Ins., VII, p. 196, n. 161.....	1792.
“ “	Fabricius, Ent. Syst., II, p. 180, n. 194.....	1793.
<i>Ophion morio</i>	Fabricius, Suppl. Ent. Syst., p. 237, n. 8.....	1798.
“ “	“ Syst. Piez., p. 132, n. 9.....	1804.
“ “	Olivier, Ency. Meth. Ins., VIII, p. 511, n. 14.....	1811.
“ <i>atricolor</i>	Olivier, Idem, p. 511, n. 15.....	1811.
<i>Ichneumon morio</i>	Thunberg, Bull. Acad. Sci. St. Petersbourg, VIII, p. 272.....	1822.
“ “	Thunberg, Mem. Acad. Sci. St. Petersbourg, IX, p. 341.....	1824.
<i>Thyreodon morio</i>	Brullé, Hist. Nat. Ins. Hym., IV, p. 152, n. 2, ♀.....	1846.
“ “	Norton, Proc. Ent. Soc. Phila., I, p. 359, n. 7.....	1863.
<i>Ophion morio</i>	Walsh, Amer. Ent., I, p. 7.....	1868.
<i>Thyreodon morio</i>	Cresson, Trans. Amer. Ent. Soc., IV, p. 170.....	1872.
<i>Ophion morio</i>	Taschenberg, Zeitschr. f. d. Ges. Nat., 46, p. 425, n. 2.....	1875.
<i>Thyreodon morio</i>	Provancher, Nat. Can., XI, p. 119.....	1879.
“ “	“ Faun. Ent. Can., Hym., p. 352.....	1883.
“ “	Dimmock, Psyche, IV, p. 282.....	1884.
“ “	Cresson, Syn. Hym. of N. A., p. 200.....	1887.
“ “	Ashmead, Hym. of Colo., Bull. Colo. Biol. Assn., p. 43.....	1890.
“ “	Packard, Fifth Rept. U. S. Ent. Comm., p. 489.....	1890.
“ “	Harrington, Ann. Rept. Ent. Soc. Ont., p. 67.....	1890.
“ “	Riley, Ins. Life, III, p. 155, host.....	1891.
“ “	Dimmock, Proc. Ent. Soc. Wash., D. C., IV, pp. 149-153, host.....	1898.
“ “	Dimmock, Idem, p. 156 (<i>Encyrtus thyreodontis</i> Ashm., a parasite).....	1898.
“ “	Bridwell, Trans. Kans. Acad. Sci., XVI, p. 204.....	1898.

<i>Thyreodon morio</i>	Ashmead, Smith's Cat. Ins. N. J., p. 580.....	1900.
" "	Dalla Torre, Cat. Hym., III, p. 186	1901.
" "	Eliot and Soule, Caterpillars and their Moths, p. 57.....	1902.
" "	Howard, Insect Book, pl. 10, fig. 15.....	1904.
" "	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 25.....	1905.
" "	Viereck, Trans. Kans. Acad. Sci., p. 313	1907.
" "	Fletcher and Gibson, 39th Rept. Ent. Soc. Ont., p. 112, Stonewall, Manitoba, July.....	1909.
" "	Morley, The Entomologist, XLII, p. 136, n. 100, June.....	1909.

Black ; face and legs sometimes more or less flavous or tinged with ferruginous ; antennæ orange-fulvous, the base and apex sometimes fuscous.

Length, 25-35 mm. ; wing, 16-25 mm. ; spread, 34-53 mm. ; antennæ, 16-23 mm.

Black ; face, mouth parts and legs sometimes more or less flavous or tinged with ferruginous ; head and thorax densely and finely punctured and clothed with fine, short, pubescence ; vertex somewhat rugose, with ocelli small, distinct, fully twice their diameter from the tops of the eyes, a median keel running from the anterior to or below the base of the antennæ ; eyes large to medium, slightly emarginate ; antennæ orange-fulvous with the scape and apex sometimes fuscous or black ; clypeus pointed in front ; clypeal foveæ deep.

Thorax black, densely punctured and clothed with short black pubescence ; thoracic sutures distinct, often crenulated ; mesonotum with parapsidal furrows more or less distinct ; pleuræ and pectus shining ; wings fuliginous ; nervulus postfurcal to interstitial ; nervellus broken well above the middle.

Legs normally black, sometimes more or less flavous or tinged with ferruginous ; claws pectinate ; abdomen shining black, sometimes with a little dark ferruginous ground color showing through.

In describing this species I have examined over 100 specimens from all parts of the United States.

Type.—Location unknown.

This common species is easily recognized by its orange-fulvous antennæ and usually entirely black body. The head and legs are sometimes more or less flavous or fulvous, and in the subspecies *transitionalis* a clear spot appears in the wings, but just how constant this is can not be stated. *T. snowi* Vier. is also closely related and may prove to be only a subspecies continuing the variation begun in *T. morio transitionalis*, but as I have not seen the type or a specimen of this

species I am unable to decide this. Though not mentioned by Cameron there are two specimens of this species which bore the MSS. label "*personatus* Cameron" in the Biologia material at the British Museum.

Distribution.—This species ranges from southern Canada into Mexico and Central America. It has been taken in Stonewall, Manitoba, and Quebec, Canada; Maine, Pennsylvania, Florida, Texas, Ohio, Arizona, Kansas and Colorado, besides many other places within these limits. Morley states that it is quite common in Central America.

Life history and habits.—This, the most common member of the genus in the United States, will be found in almost any large collection. It is diurnal, and frequently seen in July and August along wooded roads, darting every now and then into the underbrush or flying among the blossoms by the roadside. In Massachusetts it appears about the twentieth of June, but does not become abundant until the second week in July, when it continues so till the last of August. It has been taken as early as March 27 and as late as October, but it appears throughout its range to be most abundant in July and August. The eggs are laid as usual, and the pupæ formed in the earth outside of the host. Mrs. A. K. Dimmock states (in litt.) that "in one or two cases, where the host larva was left without earth, the *Thyreodon* larva came out of it for pupation. *T. morio* always hibernates as a pupa, and all of its pupations which have been observed occurred in September." The cocoon is compressed oval, 19–20 mm. long and 10 mm. broad, composed of black silk compactly glued together.

Economic importance.—The abundance of this parasite indicates that it is quite beneficial, especially as it is always fatal to its host, but thus far only two hosts have been reported. There is in the U. S. National Museum a specimen bred from *Lapara* (*Sphinx*) *coniferarum*, and Mrs. A. K. Dimmock reports a case at Cambridge, Mass., where out of thirty larvæ of *Paonias* (*Smerinthus*) *excæcatus* Abb. and Sm. eleven were killed by this parasite, and another at Canobie Lake, N. H., where four out of 26 cocoons of the same insect were paratized

by *T. morio*. One cocoon of *T. morio*, however, produced a large number of minute Hymenoptera, secondary parasites, which Dr. Ashmead determined as a new species of chalcid and has described* as *Encyrtus thyreodontis*. The exact range and effectiveness of this hyperparasite are unknown, but "from this one cocoon 170 specimens were preserved and many lost." The larvæ of *T. morio* are occasionally at least attacked by fungi, for Mrs. A. K. Dimmock states that "one of the larvæ taken at Canobie Lake, N. H., after coming out of its host died of fungus of apparently the same species which attacks its host larva."

In numerous rearings of two related sphingids, *Smerinthus jamaicensis* Dr. (*S. geminatus* Say) and *Paonias myops*, no parasitism by *T. morio* was observed.

The U. S. National Museum collection contains specimens of this species from Nyack and Long Island, N. Y.; Mass.; Conn.; Washington, D. C.; Mo., and Kansas.

***Thyreodon ferrugineus* n. sp.**

Head flavo-ferruginous; thorax and first abdominal segment ferruginous, the rest of the abdomen shining black; wings black, with a slight purplish reflection except at the apical margin.

Length, 40 mm.; wing, 22 mm.; spread, 47 mm.

Head ferruginous, more or less tinged with flavous; antennæ with scape ferruginous (remainder missing); ocelli small, distant from the tops of the eyes; eyes medium sized, at a little distance from the base of the mandibles, emarginate; face between the eyes and bases of the antennæ mostly flavous; clypeus pointed in front; clypeal foveæ shallow, more or less elongate; mandibles stout, bidentate, tipped with black.

Thorax and legs ferruginous, dorsum of thorax and the posterior legs darker; mesonotum with parapsidal furrows distinct, crenulated, converging and uniting at or before the posterior margin.

Pleuræ and pectus smooth and shining; metathorax with sides smooth and shining, behind finely rugose, its posterior two-thirds with a wide median furrow in which is an indistinct median carina; the outer border of the metathorax—behind—slightly raised, forming a depression between the median furrow and this elevation.

Wings black with a purplish reflection, except at the apex; stigma lacking; nervulus interstitial; nervellus broken above the middle;

* Proceedings of the Entomological Society of Washington, Vol. IV, page 156, No. 7, ♀.

legs ferruginous with the tibiæ darker, and the tarsi light, almost flavous.

Abdomen with the basal segment, a lateral longitudinal stripe on the second and a dorsal spot on the two apical segments ferruginous, the rest shining black, with a slight bluish reflection.

Described from one male specimen.

Type.—American Entomological Society.

This species is closely related to *T. spectabilis*, but may be readily recognized by the entirely black wings, with purplish reflection, and the ferruginous on the thorax, legs and part of the abdomen. A series of specimens may show that the tibiæ are normally black.

Distribution.—Guadalajara (Jal.), Mexico, August 27.

***Thyreodon ornatipennis* Cress.**

<i>Thyreodon ornatipennis</i>	Cresson, Proc. Acad. Sci. Phila., p. 376,	
	n. 4, ♀	1873.
" "	Cameron, Biol. Centr. Amer., Hym., I,	
	p. 290.....	1886.
" "	Dalla Torre, Cat. Hym., III, p. 186.....	1901.
" "	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc.,	
	p. 25, n. 18.....	1905.

Brownish ferruginous; antennæ fulvous; wings fuliginous with a fulvo-hyaline spot extending across the middle and sometimes occupying most of the base; dorsum of second abdominal segment more or less black.

Length, 30–40 mm.; wing, 22–25 mm.; spread, 47–54 mm.; antennæ, 20–22 mm.

Brownish ferruginous, clothed with fine short pubescence; head fulvo-ferruginous; antennæ fulvous, sometimes darker at the apex; ocelli small, distant from the tops of the eyes; eyes medium sized, broad, emarginate; face finely punctured; clypeal foveæ deep; mandibles stout.

Thorax brownish ferruginous, densely and finely punctured and pubescent; mesonotum with parapsidal furrows deep, uniting at or before its posterior border; mesopleuræ and pectus shining, sometimes with a small black spot below the base of the wings; thoracic sutures distinct, crenulated; metathorax large, globular, very finely reticulate and with median furrow, its apex at the insertion of the abdomen deeply excavated.

Wings fuliginous, with a fulvo-hyaline stripe extending across the middle of the anterior and half-way across the posterior, sometimes occupying most of the base of both; nervulus interstitial; nervellus

broken well above the middle; legs fulvo-ferruginous; tips of tarsi sometimes black; claws pectinate; abdomen brownish ferruginous; base of the second segment black above; the segments beyond the second sometimes fuscous; on one specimen the three apical segments blackish.

In describing this species I have examined the ♀ type and one ♀ specimen.

Type.—♀. No. 74, American Entomological Society.

This species varies somewhat in the extent of the fulvo-hyaline spot in the wings. It is related to *T. elegans*, but in that species the metathorax is coarsely reticulate and the ocelli slightly larger.

Distribution.—This species evidently ranges from southern United States into Central America. It was described from Mexico; Cameron reports it from Orizaba, Mexico, and I have before me a specimen from New Mexico.

Location of specimens.—American Entomological Society, type ♀, No. 74, Mexico; ♀ specimen, New Mexico.

Thyreodon elegans Cress.

<i>Thyreodon elegans</i>	Cresson, Proc. Ent. Soc. Phila., IV, p. 47.....	1865.
"	" Ashmead, Proc. Ent. Soc. Lond., p. 354.....	1900.
"	" Dalla Torre, Cat. Hym., III, p. 185.....	1901.
"	" Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 25, n. 5.....	1905.

Fulvous; wings fulvous, with a broad apical band of fuliginous; dorsum of second abdominal segment black at the base; mesonotum with three broad black bands; abdomen margined with ferruginous above and beneath.

Length, 25 mm.; wing, 11.6 mm.; spread, 25.5 mm.; antennæ, 25 mm.

Head shining yellow, with a spot behind each antenna, the vertex and a spot in the middle of the face just below the antennæ, black; most of the occiput brown-black; antennæ scarcely half the length of the body, stout, fulvous, with the apical joints black and the scape beneath tinged with yellow.

Thorax shining, slightly pubescent, finely punctured; mesonotum with three broad black longitudinal stripes, more or less distinct, the median extending from the anterior margin almost to the scutellum, the lateral ones shorter in front but reaching the posterior margin;

(lateral?) dorsal lines indistinct, median line depressed in front and slightly carinated longitudinally, the angles in front on each side of the depression elevated to an obtuse tubercle; pectus blackish, slightly reddish in front; mesosternum with a yellow line running down each side; pleuræ polished yellow, with a broad, uneven, longitudinal line on each side bordering the posterior suture; a transverse line on each side below and the entire surface between the four anterior coxæ, black; space between the pleura and metathorax blackish, broadly yellow on each side; scutellum prominent, quadrate, yellow, densely punctured, deeply excavated in front and acutely carinated on each side, the excavation blackish; postscutellum yellow; metathorax prominent, coarsely reticulated throughout, yellow, the basal suture strongly contracted; abruptly sloped behind and with a distinct, blackish, median furrow.

Wings rather short, deep yellow-hyaline, the apical margin broadly fuliginous; nervures honey-yellow; the posterior wings with a large fuscous spot near the base.

Legs yellow, a large spot at the base of the posterior coxæ, the anterior femora beneath obscurely, the four posterior femora except the base and apex, and the extreme tips of all the tarsi, blackish.

Abdomen elongate, polished, broad and compressed toward the tip; the two basal segments honey-yellow, with the posterior half of the dorsum of the first and anterior half of the dorsum of the second black; the remaining segments honey-yellow, their sides margined with bright yellow.

I have not seen a specimen of this species, and can only give the original description with slight modifications in arrangement.

Type.—♀. Caja No. 337, Instituto de Segunda Enseñanza de la Habana.*

Mr. Cresson remarks that in this beautiful species "the antennæ and wings are much shorter than in any other species of this genus."

Distribution.—Cuba.

* Mr. Wm. T. Horne writes that when he saw this type, May 22, 1909, it appeared to be in a good state of preservation. It was in a small cigar box with a glass face—Caja No. 93. This with the rest of the Gundlach collection is now in the Instituto de Segunda Enseñanza de la Habana, Obispo Street—in the first block above the palace—Havana, Cuba, Dr. Cañizares, director.

Thyreodon snowi Vier.*

Thyreodon snowi Viereck, Trans. Kans. Acad. Sci., XIX, p. 313, ♀, 1905.

Black; antennæ orange with scape brown; head, legs and margin of the mesonotum and mesopleuræ more or less brownish; wings fuscous, with a broad bare yellow area in the middle of the anterior half of the posterior pair.

Length, 25 mm.

Black; eyes and cheeks brownish; antennæ orange with the scape and pedicel brown; head somewhat broader than in *morio*; the face more even, closely and densely punctured, giving a rugulose appearance, except along the eye margins where the punctures are distinct; antennæ with 61 joints; the scape and pedicel together a little longer than the first joint of the flagellum; clypeus sparsely and deeply punctured; cheeks shining, distinctly and closely punctured.

Thorax with anterior border of the mesonotum and border of the mesopleuræ more or less brownish; mesonotum shining, distinctly and closely punctured, especially on the anterior margin, where the punctures are so close as to give a rugulose appearance; parapsidal furrows distinct, rugose, forming a V and not reaching the posterior border; scutellum closely punctured, with an acute carina; mesopleuræ closely punctured and nearly rugulose below, smooth and polished above; metathorax rugulose, the sides closely punctured behind, with a median transversely striate groove; wings fuscous, not as dark as in *morio*, with a broad bare yellow area in the middle of the anterior half of the posterior wings; neuration nearly as in *morio*, with the nervellus broken well above the middle.

Four anterior legs with their terminal trochanters, femora, tibiæ, and tarsi almost entirely, and the posterior tibiæ and tarsi brownish testaceous; middle and posterior legs with the apical joint brown.

Abdomen with petiole smooth and shining, sparsely and minutely punctured; the segments as in *morio*, clothed with inconspicuous pubescence, blackish or brownish on the dark portions, golden yellow on the pale portions.

I have not seen the type or a specimen of this species, and can only give the original description slightly rearranged.

Type.—♀. University of Kansas.

This species is closely related to *T. morio* and its subspecies *transitionalis*, and may perhaps prove to be only a subspecies, but as I have not seen the type or a specimen I give it specific rank.

Distribution.—Wallace county, Kansas, 3,000 feet, June.

* Named in honor of the late Prof. F. H. Snow.

Thyreodon spectabilis (Perty).

- Ophion spectabilis* Perty, Delect. Anim. Artic. Brasil, p. 131,
 pl. 26, fig. 10, ♀ (Lat.), Brazil.....1833.
 " " Dalla Torre, Cat. Hym., III, p. 199.....1901.
 " " Schulz, Zeits. f. Syst. Hym. Dipt., III, p. 250.1903.
Thyreodon spectabilis Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
 25, n. 21.....1905.

Head, thorax and four anterior legs flavo-fulvous; vertex, flagellum of antennæ, posterior legs and abdomen black; basal two-thirds of wings bright flavous; apex fuscous; eyes small.

Length, 31-38 mm.; wing, 20-33 mm.; spread, 43-65 mm.; antennæ, 19 mm.

Head apparently long, owing to the small size of the eyes; flagellum of antennæ black; scape fulvo-ferruginous; vertex and tips of mandibles black, head otherwise fulvous; ocelli somewhat distant from the tops of the eyes; eyes small, slightly emarginate, distant from the base of the mandibles.

Thorax fulvous, tinged with ferruginous, polished, clothed with fine yellowish pubescence, longer and more dense on the mesonotum; pleuræ and pectus polished and shining; thoracic sutures more or less distinctly crenulated; scutellum flavous, deeply excavated in front and connected with the mesonotum by two longitudinal carinæ; metathorax dull fulvous, with dense short pubescence, flat behind, with a distinct median furrow from which numerous arcuate furrows extend to the insertion of the abdomen, and two short lateral carinæ originating near the apex; wings bright fulvous, transparent, the apex with a broad fuscous band; stigma lacking; basal half of costa fulvous; nervures otherwise fuscous; nervulus interstitial; nervellus broken well above the middle; first recurrent vein about one-third the length of the second; outer two-thirds of the discocubital vein nearly parallel with the subdiscoidal vein.

Four anterior legs fulvous, excepting their tarsi, which are black; posterior legs black, with the base and apex of the femora ferruginous; in one specimen these two bands are connected by a narrow longitudinal stripe of the same color; abdomen shining black, strongly compressed.

In describing this species I have compared three specimens with the original description.

Type.—♀. Location unknown.*

This is one of the largest species of *Thyreodon*, and may be readily recognized by its contrasting colors. It apparently varies somewhat in the size of the ocelli. I have before

* Schulz states that it is not at the Munich State Museum.

me specimens with the small ocelli characteristic of *Thyreodon*, but Schulz seems to have had specimens with large ocelli, for he believes that *spectabilis* belongs to the Genus *Athyreodon*. Dr. Schmiedeknecht's description of *A. apicalis* agrees with *spectabilis* except for the large ocelli. Judging from this and from a specimen before me in which the ocelli are larger than in normal *Thyreodons*—though not so large as in *A. thyreodon*, I believe that *T. spectabilis* forms the connecting link between *Thyreodon* and *Athyreodon*, and that the size of the ocelli is not as yet well fixed.

Distribution.—This species apparently ranges from Panama to southern Brazil. It was described from Brazil at the Rio Negro, and I have before me specimens from Chauchamayo, Peru, and Hermira Falls, Surinam, Dutch Guiana, sixty miles up the Maroni River. Nothing is recorded of its life history, habits or hosts.

Location of specimens.—U. S. National Museum, two ♀'s, Chauchamayo, Peru; Surinam, Dutch Guiana. Massachusetts Agricultural College, Peru. British Museum.

***Thyreodon grenadensis* Ashm.**

<i>Thyreodon grenadensis</i>	Ashmead, Trans. Ent. Soc. Lond., p. 270,	
	n. 179.....	1900.
" "	Dalla Torre, Cat. Hym., III, p. 185.....	1901.
" "	Szepliget, Gen. Ins., Hym., 34 ^{me} Fasc.,	
	p. 25, n. 11.....	1905.

Length, 34 mm. ♀.

Head, thorax, two basal segments of the antennæ and four anterior legs, except their tarsi and hind coxæ, ferruginous; eyes, flagellum of antennæ, hind legs, except coxæ, and abdomen, black; wings hyaline, with a smoky cloud at the basal third enclosing the apex of the submarginal cell and basal vein, and another enclosing the marginal cell, except a small space at its base.

I have not seen the type or a specimen of this species, and can only give the original description.

Type.—♀. Location unknown.*

I am not sure of the identity of this species, and it may

* It has not been found at either the British Museum or U. S. National Museum, but may possibly be found in Dr. Ashmead's private material.

prove to be synonymous with *A. atriventris*. It certainly resembles this species in structure and color, but as Dr. Ashmead placed it in the Genus *Thyreodon* instead of *Athyreodon*, it must be considered as possessing the small ocelli characteristic of *Thyreodon*.

Distribution.—Isle of Grenada (Balthazar).

***Thyreodon maculipennis* Cress.**

<i>Thyreodon maculipennis</i>	Cresson, Proc. Acad. Nat. Sci. Phila.,	
	p. 375, n. 2, ♀ ♂.....	1873.
" "	Dalla Torre, Cat. Hym., III, p. 185.....	1901.
" "	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc.,	
	p. 25, n. 13.....	1905.

Black; wings black, with a purplish reflection and a hyaline spot in the discocubital and third discoidal cells.

Length, 25–26 mm.; wing, 17–18 mm.; spread, 26–29 mm.

Shining black, with a more or less distinct purplish reflection; clothed with fine short pubescence; ocelli flavous, medium sized, with a median keel running from the anterior to or a little below the bases of the antennæ; eyes emarginate, medium sized; clypeal foveæ distinct;

Thorax finely pubescent; mesonotum with parapsidal furrows weak. pleuræ and pectus smooth and polished; metathorax flat behind, with a median longitudinal furrow and numerous arcuate carinæ originating about the insertion of the abdomen,

Wings violaceous black, the anterior pair with a hyaline spot in the discocubital and third discoidal cells; nervulus antefurcal to interstitial; nervellus broken above the middle.

Legs and abdomen shining black.

In describing this species I have compared the cotypes with the original description. The antennæ are missing.

Cotypes.—Two ♀'s and one ♂. No. 70, Mexico, American Entomological Society.

This species is closely related to *T. morio transitionalis*. *T. maculipennis* may be separated by the violaceous reflection of the body and wings, which indicates that it is related to and may be a subspecies of *T. cyaneus* or *grandis* with similar variation from the species to that of *transitionalis* from *morio*. The antennæ of all the cotypes are, however, missing, so that I am unable to decide this question.

Distribution.—This species has been reported from Cordoba and Orizaba, Mexico, and probably ranges into Central America.

Thyreodon marginipennis Br.

- Thyreodon marginipennis* Brullé, Hist. Nat. Ins. Hym., IV, p.
152, n. 3, ♂1846.
Ophion marginipennis Taschenberg, Zeitschr. f. d. Ges. Natur.,
46, p. 425, n. 3.....1875.
Thyreodon marginipenne Holmberg (E. L.), Anal. Soc. Cient.
Argent., 18, Pt. 5, p. 227, n. 371884.
 " *marginipennis* Dalla Torre, Cat. Hym., III, p. 185.....1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 25, n. 14.....1905.

Black; wings flavo-ferruginous, with the apex fuscous; nervures reddish except in the smoky portion; metathorax strongly rugose.

Length, 25 mm.

Head with face strongly rugose, the interantennal fossa with its edge much raised; basal segment of the antennæ red, the second red at the outer end, the remaining segments black; mandibles with the middle reddish ferruginous; metathorax very finely punctate; the median lobe of the mesonotum raised in the middle and finely rugose the whole length of the deep parapsidal furrows; metathorax strongly rugose, without median dorsal furrow; metanotum and pleuræ a little flattened. Scutellum strongly punctate; wings light yellow to ferruginous, apex smoky, in the manner of a transverse band; nervures red except in the smoky portion where they are brown, their arrangement as in *T. morio* Fabr.; legs and anterior tarsi reddish-brown; abdomen black, anal valves truncate.

Type.—♀. Location unknown to me.

I have not seen the type or a specimen of this species, and can only give the original description as modified by Holmberg who writes as follows:

"Brullé cites this species from Buenos Ayres, from where I also received it, and the only one, but he says nothing of the brilliant steel-blue of the specimen seen under certain conditions of light. He notes that the wings are washed with yellow, but I have before me one where they are lion-colored or ferruginous; he had a mutilated male specimen, and that is the one which I examined."

Distribution.—Buenos Ayres, Argentina.

Thyreodon flammipennis Ashm.

- Thyreodon flammipennis* Ashmead, Proc. Cal. Acad. Sci., IV, p.
125, n. 10, ♀1894.
 " " Dalla Torre, Cat. Hym., III, p. 185.....1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
p. 25, n. 8.....1905.

Black; wings bright fulvo-ferruginous, the tips margined with fuliginous; head and thorax opaque and closely punctate.

Length, 23-32 mm.; wing, 25 mm.; spread, 54 mm.

Black; head and thorax opaque and closely punctate; head transverse, a little narrower than the thorax; ocelli small, distant from the tops of the eyes; eyes slightly emarginate, medium sized, broad, at some distance from the base of the mandibles; antennæ extending to the apex of the petiole of the abdomen; * face with a median carina extending from between the bases of the antennæ, where it is most pronounced, nearly to the apex of the clypeus, where it is more or less obliterated; labium produced; mandibles black, sometimes more or less flavous; thorax opaque and closely punctate except the sternum, pleuræ and sometimes the back of the mesonotum, which are shining; mesonotum with parapsidal furrows indistinct or lacking; metathorax opaque, rugose behind, the sides closely punctate and more or less shining.

Wings bright fulvo-ferruginous, the apex and sometimes a spot at the base fuliginous; nervulus interstitial; nervellus broken above the middle; abdomen smooth and shining, the segments beyond the third sometimes acuminate.

In describing this species I have compared one specimen from Mexico with the original description.

Type.—Location,† California Academy of Science.

This species is related to *T. marginipennis* and may prove to be synonymous; it is also related to *T. morio*, but may be readily recognized by the bright fulvo-ferruginous wings. Dr. Ashmead remarks that it evidently mimics some of the spider-killing wasps (Ceropalidæ, *Pompilus* and *Pepsis*), but nothing is known of its life history or habits.

Distribution.—This species probably ranges through southwestern United States and Mexico. It was described from California, and I have before me a specimen from Mexico.

Location of specimens.—American Entomological Society, Mexico.

* Dr. Ashmead does not particularly mention the color of the antennæ, hence it appears that they are black, but I have before me an otherwise characteristic specimen of this species in which at least the basal two-thirds of the flagellum (the rest is missing) is fulvous, the scape black. This question can not be definitely settled now as I have been unable to locate the type in time to get any information on the subject, but there is possibly some variation in this character.

† Collected by Mr. Eisen of the California Academy of Science, and now located with that part of the collection saved from the earthquake and fire of 1906, at 1219 F street, Topham, Cal.

Thyreodon fernaldi n. sp.*

Black; antennæ orange-fulvous, face and legs more or less fulvo-ferruginous; abdomen with third and fourth segments, sometimes part of the second and fifth segments, ferruginous; wings fuliginous, with basal two-thirds of the anterior and a small spot on the posterior fulvous or fulvo-fuscous.

Length, 38-45 mm.; wing, 24-29 mm.; spread, 51-62 mm.; antennæ, 22-29 mm.

Black, clothed with fine short pubescence; head and thorax closely and finely punctate; head black, more or less varied with fulvous or ferruginous; ocelli small, distant from the tops of the eyes; eyes large, emarginate, antennal fossæ deep; antennæ orange-fulvous, with the scape sometimes fuscous to black; clypeal foveæ distinct; clypeus weakly pointed; mandibles broad and stout.

Thorax black; metathorax opaque; pleuræ and pectus shining; mesonotum opaque or semi-opaque; parapsidal furrows weak, double; scutellum excavated in front, with strong lateral carinæ connecting it with the mesonotum; metathorax finely reticulate, with short pubescence, flat or very slightly hollowed behind.

Wings fuliginous, with the basal two-thirds to the apex of the closed cells of the anterior and a small spot in the median and radial cells of the posterior fulvous or fulvo-fuscous; nervulus antefurcal to interstitial, in one specimen very slightly postfurcal; nervellus broken well above the middle.

Legs more or less fulvo-ferruginous; coxæ, femora and feet often black; abdomen black, with the third and fourth and often part of the second and fifth segments ferruginous, smooth and shining, with fine, short, pubescence; ovipositor reddish; male claspers with outer two-thirds narrowed; apex pointed.

Described from three ♀ and one ♂ cotypes.

Cotypes.—♀ and ♂. Mexico, U. S. National Museum; ♀, Arizona, American Entomological Society; ♀, Colorado, Brooklyn, Museum.

This species is related to *T. morio* and its subspecies *transitionalis* as well as to *T. laticinctus* and *zonatus*. It is, however, larger than *morio*, with the abdomen more slender, and may be readily recognized by the fulvo-hyaline spot on the wings and the ferruginous band on the abdomen. Both of these vary somewhat in extent but seem to be characteristic.

Distribution.—Colorado; Arizona; Mexico.

This species apparently ranges through the mountainous

* Named in honor of Dr. H. T. Fernald.

district of southwestern United States and Mexico, possibly into Central America. The cotypes were taken in Colorado; Huachuca Mountains, Arizona; and Meadow Valley, Mexico. Nothing is known of the life history, habits or hosts.

Thyreodon morio transitionalis Vier.

Thyreodon morio transitionalis Viereck, Trans. Amer. Ent. Soc.,
32, p. 225.....1906.

Black; face, mouth parts and legs sometimes more or less fulvous, or tinged with black, with a flavo-hyaline spot in the discocubital and third discoidal cells of the anterior wing and sometimes a second in the marginal cell of the posterior wing

Length, 25-35 mm.; wing, 15-25 mm.; spread, 32-53 mm.; antennæ, 15-23 mm.

This subspecies differs from *morio* in having the basal third of the radial cell, most of the discocubital and third apical cells of the anterior wing, and sometimes the marginal cell of the posterior wing, fulvo-hyaline; the size of these spots varies somewhat, and the head and legs are sometimes more or less flavous or fulvous tinged with ferruginous as in *morio*.

In describing this species I have examined five specimens.

Type.—University of Kansas.

This form is too closely related to *morio* and the fulvo-hyaline spots too inconstant to permit of more than subspecific rank. Owing to lack of material I am unable to determine the limits of this variation, but *T. snowi* is certainly related and may prove to be a continuation of this. *T. maculipennis* is also closely related, but the wings and body have a more or less distinct violaceous reflection.

Distribution.—The range of this subspecies is probably similar to that of *T. morio*, from southern Canada to Central America. The type was taken at Oak Creek Cañon, Arizona, at 6,000 feet, and I have before me specimens from Sarcoxie, Missouri, and Riley County, Kansas; Lake Itasca, Minn.; and also from Amherst, Mass. The life history, habits and hosts are unknown, but probably agree with those of *T. morio*. The two Kansas specimens were taken June 1 and July 2, one from Minnesota in July, and those from Amherst June 20 and 29, while the type was taken in July at 6,000 feet.

Location of specimens.—University of Kansas, ♀ type, Oak

Creek Cañon, Arizona, 6,000 feet. U. S. National Museum, Sarcoxie, Missouri; Jefferson County and Riley County, Kansas. Massachusetts Agricultural College, Amherst, Mass. Minnesota Agricultural College, ♀, Lake Itasca.

***Thyreodon erythrocerus* Cam.**

- Thyreodon erythrocerus* Cameron, Biol. Centr. Amer., Hym., I, p.
 288, n. 2, pl. 12, fig. 13.....1886.
 “ *erythrocerus* Dalla Torre, Cat. Hym., III, p. 185.....1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
 p. 25, n. 6.....1905.

Body and wings black; antennæ reddish, with base and apex black.
 Length, 32 mm.

Head closely covered with black hair; vertex almost impunctate; antennæ reddish, with base and apex black; eyes distinctly margined, the hollow over the antennæ with large, curved, transverse striations; face deeply punctured; clypeal foveæ deep and longish; mandibles and palpi covered with long brownish hair.

Thorax opaque above; mesopleura impunctate and shining; mesonotum everywhere closely and distinctly punctured, scutellum shining and punctured, but not so closely; keels in front of the scutellum closely striate; metathorax opaque, depressed at the base and bulging somewhat at the sides, hollowed in the center behind, the depression widest at the apex; metanotum closely and transversely, the pleuræ more strongly, striated.

I have not seen a specimen of this species, and can only give the original description slightly rearranged.

Types.—♀ and ♂. British Museum.

Cameron writes: “This species has the deep black body, wings and reddish antennæ (black at the base and apex, of *T. morio*) Fabr. and *T. gracilis** Cr., but is probably distinct from either.” After carefully considering the variation in the different species of *Thyreodon* I believe that this species is synonymous with *T. grandis* Cress., but as I have not seen the type or a specimen I have preserved it for the present.

Distribution.—Mexico; Valladolid in Yucatan.

* I find no other reference to *Thyreodon gracilis*, and this is probably a typographical error, the species referred to being *T. grandis*. It is possible that *T. gracilis* may have been given as a manuscript name, but it apparently never passed that stage.

Genus **OPHIOMORPHA** Szep.

Ophiomorpha Szepilgeti, Gen. Ins., Hym., 34^{me} Fasc., p. 34.....1905.

Head narrowed behind the eyes; clypeus more or less rounded, not separated; eyes and ocelli large. Parapsidæ lacking or indistinct, scutellum bordered; basal section of radial vein thickened and bordered, the end section bowed; nervus parallelus inserted above; nervellus broken below the middle. Radial vein of hind wings straight. Claws pectinate. Abdomen compressed, second segment seldom shorter than the first.

Generic type.—*O. curvinervis* Cam.*

I have not seen either of the two species in this genus, and can therefore give only a free translation of the general characters of the genus. It is, however, closely related to *Eremotylus*.

Distribution.—Brazil; Guatemala.

Nothing is known of the life history, habits or hosts of the members of this genus.

Table of Species.

Antennæ brown or brownish, stigma yellowish red**bicolor** Szep.

Antennæ black, flagellum more or less brownish beneath, scape sometimes yellow beneath, stigma clay-yellow.

curvinervis Cam.

***Ophiomorpha bicolor* Szep.**

Ophiomorpha bicolor Szepilgeti, Gen. Ins., Hym., 34^{me} Fasc., p.

35, n. 2.....1905.

Length, 25 mm.

Face very finely punctured; antennæ as long as the body. Mesonotum smooth, flat; mesopleuræ shining, weakly wrinkled below; metapleuræ leathery; metanotum with uneven projections on each side and a transverse band, the sides bordered, the middle part irregularly transversely wrinkled; nervulus antefurcal. Second segment of abdomen as long as the first, yellowish red; antennæ brownish or brown; abdomen from the third segment on brown—excepting the anterior upper part of the third—or black, the third and fourth segments with oblong yellow spots on the sides. Wings light yellowish, nervures and stigma yellowish red.

* Since the generic type is not designated the case is governed by the International Code, Art. 30, according to which preference should be given to the best described, best figured, best known, most easily obtained species or one of which a type can be obtained. Following this recommendation I indicate *O. curvinervis* Cam. as generic type.

I have not seen a specimen of this species, and can only give a free translation of the original description.

Type.—♀. Location unknown to me.

Distribution.—Brazil.

Ophiomorpha curvinervis Cam.

Ophiomorpha curvinervis Cameron, Biol. Centr. Amer., Hym., I,
p. 293, pl. 12, fig. 19, ♀1886.

Luteous; head, pleuræ and scutellum flavous; wings hyaline; stigma luteous; antennæ blackish brown.

Length, 29-31 mm. ♀.

"Antennæ as long as, if not longer than, the body; black, the flagellum more or less brownish on the lower side, the scape sometimes luteous beneath. Head shining, obscurely punctured, not much projecting in the middle; clypeal foveæ deep, longish. Thorax covered with close pale pubescence. Mesonotum very minutely punctured; the pleuræ finely longitudinally striated. Scutellum carinate along the sides. Metanotum with one transverse keel near the base; the base behind it finely rugose; the rest of the surface finely rugose and bearing arcuate keels. Metapleuræ finely rugose. Petiole shining, glabrous, slightly hollowed in the center above at the base; postpetiole clearly separated from and distinctly thicker than the petiole, densely covered with a white pubescence; the petiole itself is narrowed at the apex; together they are nearly as long as the second segment, which is dilated at the apex. The transverse radial nervure is curved upwards in the middle on the basal division, the apical portion having a gradual curve from the base to the apex, the extreme apex curved upwards; the angle formed at the apex of the first cubital cellule shorter on the upper than on the lower side."

I have not seen a specimen of this species, and can only give the original description.

Type.—British Museum.

Distribution.—Las Mercedes, 3,000 feet, Senahu, Guatemala.

Genus **EREMOTYLUS** Först.

- Eremotylus* Förster, Verh. Preuss. Rheinl., 25, p. 150, n. 8.....1868.
Allocamptus Thomson, Opusc. Ent., 12, p. 1189.....1888.
 " Brauns, Arch. Nat. Mecklenb., XLIII, p. 97.....1889.
Eremotylus Brauns, Idem, p. 98.....1889.
Allocamptus Dalla Torre, Cat. Hym., III, p. 180.....1901.
Eremotylus Dalla Torre, Idem, p. 184.....1901.
Camptoneura Kriechbaumer, Zeitschr. f. Syst. Hym. Dipt., I, p. 22.....1901.
Leptophion Cameron, Proc. Zool. Soc. Lond., 227.....1901.

<i>Eremotylus</i> Felt, N. Y. State Mus., Bull. 76, Nineteenth Rept. State Ent., p. 101	1904.
“ Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., pp. 22, 35.....	1905.
<i>Allocamptus</i> Szepligeti, Idem, pp. 22, 36.....	1905.
“ Schulz, Spolia Hym., p. 277	1906.
“ Schmiedeknecht, Hym. Mitteleurop., p. 594.....	1907.
<i>Eremotylus</i> Schmiedeknecht, Idem.....	1907.
<i>Cymatoneura</i> Schmiedeknecht, Opusc. Ichn., XVIII, p. 1419, n. 15, p. 1423, n. 29; XIX, p. 1449, n. 7.....	1908.
<i>Eremotylus</i> Schmiedeknecht, Idem, XVIII, p. 1423, n. 29; XIX, p. 1450, n. 8.....	1908.

Discocubital cell without maculæ; discocubital vein never angularly broken or appendiculatè; radial vein once or twice bent or angularly broken; nervellus broken usually below the middle; claws pectinate.

Generic type.—*E. marginatus* Jur. (Brauns, monotypical).

The genus *Eremotylus* as proposed by Förster included in a general way the Ophionini outside of the two genera *Ophion* (under which many entomologists even as late as 1875 included *Thyreodon* and what is now known as *Athyreodon*) and *Enicospilus*. This genus was proposed in a key and the characters given were :

“Wings without areola; discocubital vein not angularly broken; cubital cross vein straight, with the cubital vein uniting in a very pointed angle, the latter running from the head of the angle to the tip of wing; discocubital cell without dark colored spots.”

Thomson evidently did not know of this genus, or did not consider it valid—as no species had been designated—for he does not mention it, but proposes *Allocamptus* as a subgenus of *Enicospilus* and practically equivalent to Förster's *Eremotylus*. He separates his subgenus from *Enicospilus* by the absence of maculæ, and the radius being twice bent. The characters given are :

“Wings without membranaceous maculæ but the base of the radius strongly bent, nervulus and nervellus well antefurcal, metathorax with rudimentary angular area below, broadly excavated behind, narrowed transversely; mesosternum granulose-punctate, emarginate behind, foveæ below the punctured speculum impressed.”

In 1889 Brauns revised this group of insects, restricting *Eremotylus* and *Allocamptus* but retaining both and separating them by the character of the radius, this being once bent

in *Eremotylus* and twice bent in *Allocamptus*. As the first revision this must be accepted (International Code, Article 28) if the two genera are retained. Kriechbaumer and Schmiedeknecht also retain the two genera* with practically the same generic differences, which are :

“Metathorax with only one weak transverse carina ; base of radius doubly bent, mesosternum granularly punctured, nervulus and nervellus plainly postfurcal.

***Allocamptus* Thoms. (*Cymatoneura* Kriechb.).**

Metathorax with an anterior carina strongly raised in the middle, more or less strongly reticulate ; base of radius once bent.

***Eremotylus* Förster (*Camptoneura* Kriechb.).”**

Examinations made of a long series of specimens show that none of these supposedly generic characters are constant in the American species which I have seen. The anterior metathoracic carina varies in shape and size throughout, as does the amount of the reticulation of the metathorax. The amount of flexure of the base of the radius shows similar variation, and a good series of *E. macrurus* and *E. arctiæ* furnishes specimens which show a complete gradation from the once-bent to the twice-bent condition. In *E. texanus* Ashm. we find a similar variation, while *macrurus* and *angulatus* and *flavofuscus* with its subspecies *radialis* show variation along another line, the radius being angularly broken. Specimens of *E. macrurus*, *E. arctiæ*, etc., show that differences in punctuation of the mesosternum appear equally in all the species. The nervulus is interstitial or prefurcal—sometimes well prefurcal—and the nervellus is broken well below the middle, in all American specimens of this group which I have seen, not as Schmiedeknecht says, “plainly antefurcal in *Allocamptus*.” These differences described by Schmiedeknecht and others may be fixed in the European species, allowing a division into two genera, but they certainly are not in the American forms and are therefore of only specific value. There is undoubtedly variation along the lines of radius once-bent and twice-bent as shown in *macrurus* and

* Kriechbaumer proposes the name *Cymatoneura* to take the place of the generic name *Allocamptus* Thoms., which was preoccupied by *Allocamptus* Förster.

arctiæ, but there is also variation of the radius angularly broken as shown in *flavofuscus* and others. The shape of the radius is therefore quite variable, like the other characters considered above. For these reasons and from general observation and comparison I believe that the species are too closely related, and the diverging characters as yet too variable to permit their separation into two genera. I have therefore united the two genera, *Eremotylus* and *Allocamptus*, under *Eremotylus* Förster, the oldest valid generic name.

Förster, when proposing *Eremotylus* in 1868, gave its generic characters in a table but designated no species under it, and none was placed there till 1889, when Brauns designated *Eremotylus marginatus* Jur. (Arch. Nat. Meckl., 43, p. 98). The genus *Allocamptus*, was proposed by Thomson in 1888 as a subgenus of *Enicospilus*, and *Ophion undulatus* Grav. was placed as a member. In 1889 (Arch. Nat. Meckl., 43, p. 97) Brauns raised it to generic rank including the same species.*

The generic name *Allocamptus* was, however, preoccupied by *Allocamptus* Förster 1868, and as a homonym can not stand even though the latter has proved to be a synonym of *Enicospilus* Steph.†

Kriechbaumer recognized this fact, and in 1901 (Zeitsch. Hym. Dipt., I, p. 18) proposed the name *Cymatoneura*, which should supersede the generic name *Allocamptus* Thoms. if that genus was valid. In uniting these two genera I have followed the International Code of Nomenclature (Art. 28), by which "a genus formed by the union of two genera or subgenera takes the oldest valid generic name of its components. If the names are of the same date, that selected by the first reviser shall stand," and have preserved the generic name *Eremotylus* Förster, considering that since the name

* This description of the genus *Allocamptus* Thoms. and designation of type are given in the same volume, only one page ahead of a description of—not the original—and designation of the type for the genus *Eremotylus* Förster,

† Internat. Code Nom., Arts. 34, 36; "A generic name is to be rejected as a homonym when it has previously been used for some genus of animals."

Allocamptus Thomson was a homonym, the genus was not valid until a new name was proposed by Kriechbaumer in 1901. Others may determine the delicate question whether *Eremotylus* Förster should date from 1868 or 1889, but I consider it as certainly established in 1889, when a species was first designated. I recognize the movement in favor of a rule that no generic name shall have standing until a recognizable species has been placed under it, although this is not as yet adopted by the International Commission on Zoological Nomenclature. Until the adoption of such a rule it would seem that *Eremotylus* Först. must hold. Such a rule would, however, eliminate the generic names *Eremotylus* and *Allocamptus* of Förster, and *Allocamptus* Thomson would then become the generic name for this group.

Distribution.—The species of this genus are widely distributed from the southern part of boreal North America to the southern part of South America, including the West Indies. *E. macrurus* has perhaps the widest range, having been taken from Ottawa, Canada, to Central America and Trinidad. The distribution of the other species is not as yet well known, but is apparently more limited.

Life history and habits.—Little is known of the life histories of the members of this genus, except for *E. macrurus*, but they probably differ little from that of this species, which is treated under the general heading for the tribe and the species.

Economic importance.—The host list of most of the members of this genus is very incomplete, but so far as known they are parasitic upon the Arctiidæ and Saturniidæ and one species of Notodontidæ. *E. macrurus* is a common parasite of the large cecropia larvæ and allied species, and the control of these is undoubtedly due to the activity of these parasites. The importance of *E. macrurus* is, however, somewhat diminished by the fact that it often fails to make a proper pupa; the late Dr. J. B. Smith reported a case in which but 19 adults were obtained from 79 pupæ. "In some localities, at least, sound larvæ and pupæ are the exception, and one usually finds on cutting the cocoon only a putrid brown, semi-

liquid mass. This indicates that this parasite is kept in check by some disease that reaches it within the body of the host." Investigations at the Gypsy Moth Laboratory show that *macrurus* is often the victim of other parasites of the same host, or of secondary parasites.

Variation.—The members of this genus seem to be among the most variable of the American representatives of the tribe. Variation in size and venation is quite marked, especially in *E. macrurus* L. Here the size runs from 22–36 mm.; the color varies from ferruginous to flavous with all intermediate gradations; the wings vary from a complete fulvous to hyaline—the color seems to be most permanent at the base, disappearing first at the apex and working towards the body. Variation in color works, as always, in two directions, (1) towards the light or albinic and (2) towards the dark or melanic. Most specimens are fulvo-ferruginous, with a distinct fulvous tinge in the wings, but throughout the entire range there are always a few of the light forms. These seem to be more numerous, however, in southern United States and Mexico. The melanic forms do not seem to show as great variation, but *E. texanus* greatly resembles *macrurus*, and may prove to be a melanic form. Its fuscous wings and dark ferruginous body, more or less marked with black, seem, however, to be sufficiently fixed to be considered specific, yet this can not be finally settled until breeding experiments have been carried on. In venation the radius may be as in *macrurus*, enlarged at the base and in some specimens doubly bent, but a good series generally shows a gradation to the once-bent condition seen in *E. arctiæ*. In *macrurus*, *angulatus*, and *flavofuscus* the radial vein is angularly broken about 1 mm. from the stigma. The angularly broken radial vein is, I believe, the older condition, showing where the first transverse cubital nervure branched off. Breeding experiments may show that *arctiæ* is only a subspecies of *macrurus*, but the species as I have restricted it seems to have well fixed characters. The variation in size may be easily explained by a difference in the amount of food supply of the larva. Similar variation in

color occurs in most orders, and Tower's explanation may prove to be the right one here.*

Table of Species.

1. Wings fuliginous or infuscated, eyes small, only slightly emarginate.....11.
Wings hyaline or tinged with fulvous, eyes distinctly emarginate..2.
2. Abdomen with the apex dark brown or black.....3.
Abdomen with the apex not dark brown or black.....6.
3. Abdomen beyond the second or third segments black.
rufoniger n. sp.
Abdomen beyond the second or third segments dark brown.....4.
4. Base of radial vein angularly broken.....**flavofuscus** Br.
Base of radial vein not angularly broken.....5.
5. Mesonotum with three black stripes (thorax luteous).
flavofuscus radialis n. subsp.
Mesonotum without three black stripes.....10.
6. Base of radial vein thickened.....7.
Base of radial vein narrowed (near the stigma).....8.
7. Stramineous, wings hyaline.....**stramineus** Tasch.
Fulvo-ferruginous to flavous, wings usually tinged with fulvous.
macrurus L.
8. Base of radial vein angularly broken**angulatus** n. sp.
Base of radial vein not angularly broken.....9.
9. Apex of antennæ fuscous.....**tenuigena** Kriechb.
Apex of antennæ not fuscous.....10.
10. Discocubital vein arcuate, wings hyaline.....**aretiae** Ashm.
Discocubital vein sinuous, wings usually tinged with fulvous.
macrurus L.
11. Testaceous; nervellus broken far above the middle.
infuscatus Tasch.
Ferruginous, nervellus broken below the middle...**texanus** Ashm.

Eremotylus rufoniger n. sp.

Ferruginous; antennæ fuscous to black; vertex flavous; stigma fulvous; radial vein with the basal half thickened and angularly broken two mm. from the stigma.

Length, 20-25 mm.; wing, 17-19 mm.; spread, 36-40 mm.; antennæ, 25-28 mm.

Head reddish-yellow to rufous; vertex flavous; antennæ fuscous to black, as long or longer than the body; ocelli large, prominent, well

* Tower, *Evolution of Leptinotarsa*, p. 214: "(a) The factors most potent in the modification of coloration are temperature and moisture; soil and altitude act indirectly through moisture and temperature, while the influences of food, light and other factors are very slight."

separated; eyes large, emarginate; clypeal foveæ deep; body clothed with fine short pubescence.

Thorax fulvo-fuscous; mesonotum fuscous; mesopleuræ with a glabrous area just below the base of the wings; metathorax slightly hollowed behind, with weak anterior transverse carina, in front of which the surface is smooth, behind with median longitudinal carinæ from which others run out and down.

Wings hyaline, slightly tinged with fulvous; stigma fulvous; nervures fuscous to black; radial vein with its basal half thickened and angularly broken 2 mm. from the stigma; discocubital vein bent; nervulus antefurcal to interstitial; nervellus broken far below the middle; first recurrent vein three-fourths as long as the second.

Legs fulvous; abdomen with the two basal segments fulvo-rufous, the remaining segments black.

Described from two female cotypes.

Cotype.—♀. Chauchamayo, Peru, U. S. National Museum;
♀, Pozuzo, Peru, U. S. National Museum.

This species is related to *flavofuscus* Br. but is darker colored and the fuscous on the abdomen of *flavofuscus* is here replaced by black; while the body is rufo-fuscous instead of flavous as in the latter. This may be only a subspecies of *flavofuscus* but appears to be a good species with the characters well fixed. In one of the cotypes most of the head is fuscous.

Distribution.—Chauchamayo, Pozuzo, Peru. It probably ranges farther north and south.

Eremotylus flavofuscus (Br.).

Ophion flavo-fuscus Brullé, Hist. Nat. Ins., Hym., IV, p. 139, n.

4, Brazil.....1846.

“ *flavofuscus* Dalla Torre, Cat. Hym., III, p. 191.....1901.

“ “ Szepliget, Gen. Ins., Hym., 34^{me} Fasc., p. 31,
n. 100, listed.....1905.

Glauco-flavous; abdomen beyond second segment fuscous; antennæ flavo-fuscous; wings hyaline, radial vein angularly broken near the base; mesonotum with three longitudinal fuscous stripes.

Length, 21–32 mm.; wing, 17–20 mm.; spread, 36–43 mm.; antennæ, 20–25 mm.

Head and thorax glauco-flavous; eyes and ocelli ferruginous to fuscous; ocelli (often with an outer ring of flavous) large, prominent, well separated, the two posterior close to the tops of the eyes; eyes emarginate; antennæ fulvo-ferruginous, often fuscous, especially at the tips, long, filiform, with a small, indistinct median tubercle below and between their bases; clypeal foveæ distinct; mandibles bidentate, tipped with black.

Thoracic sutures, pectus and coxæ sometimes ferruginous; mesonotum smooth, with three broad longitudinal fuscous stripes of equal length, the median half its length in front of the others; scutellum prominent, convex, hollowed in front, and bordered with lateral keels connecting with the mesonotum; metathorax with an anterior transverse carina, in front of which it is smooth, behind wrinkled, with a shallow median longitudinal furrow and arcuate carinæ originating around the insertion of the abdomen.

Wings hyaline, sometimes slightly tinged with fulvous; nervures flavo-fuscous, stigma flavous; radial vein angularly broken about 1 mm. from the stigma, thickened beyond the break; discocubital cell with a small glabrous area inclosing one or two indistinct, colorless, irregular spots; discocubital vein sinuous; nervulus antefurcal; nervellus broken well below the middle.

Legs fulvous, claws pectinate.

Abdomen smooth and shining; beyond the first or second or middle of third segment fuscous, the remainder flavous; the whole body sparsely clothed with fine short pubescence.

Redescribed from two females; one male specimen from Peru compared with the original description.

Type.—Location unknown.

Distribution.—Brazil; Haituba, Peru.

This species is evidently tropical, having been taken in Brazil and Peru, and probably inhabits Bolivia and Ecuador, possibly going into Colombia, Venezuela, and Guiana. I can find no reference to this species since Brullé's original description of a specimen from Brazil, but there are in the Massachusetts Agricultural College collection several specimens from Peru which seem to agree with Brullé's description.

Life history.—I can find no reference to the life history, habits or hosts of this species, and hence can give no idea of its economic value as a parasite.

Location of specimens.—Massachusetts Agricultural College, two ♀'s and one ♂ from Peru.

***Eremotylus flavofuscus radialis* n. subsp.**

I consider as a subspecies two female specimens from Peru which differ from *flavofuscus* in that the radial nervure is evenly bent, not angularly broken.

Cotypes.—Two ♀'s, Peru, Massachusetts Agricultural College.

Eremotylus stramineus (Tasch.).

- Ophion stramineus* Taschenberg, Zeitschr. Ges. Nat., Vol. 46, p.
 431, n. 13, ♀, America borealis.....1875.
 " " Dalla Torre, Cat. Hym., III, p. 199.....1901.
Allocamptus stramineus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
 pp. 22, 36.....1905.

Stramineo-flavous; sericeous, wings hyaline; nervures straw-yellow; metanotum very finely rugose.

Length, 22 mm.

Pale yellow, approaching ripe straw-color; mesonotum with two weak longitudinal carinae and metathorax with weak anterior transverse carina and very finely rugose; wings hyaline, base of radius thickened and twice bent, discocubital nervure arcuate, nervellus broken well below the middle. Apex of abdomen generally darker, appearing somewhat spotted. In consequence of the finer wrinkling of the mesonotum, the lighter color, complete transparent wings and smaller size it appears more delicate than *Eremotylus undulatus*.

I have not seen a specimen of this species, and can therefore give only a free translation of the original description.

Type.—Location unknown.

This may prove to be a synonym of *macrurus*, but as I have not been able to see the type or secure material I have given the contents of the unfortunately incomplete original description. I can find no other reference to this species and nothing seems to be known of its life history, habits or hosts.

Eremotylus angulatus n. sp.

Plate. II, fig. 13.

Fulvous; wings hyaline or slightly fulvous; radial vein angularly broken 2 mm. from the stigma.

Length, 38 to 45 mm.; wing, 39 to 45 mm.; spread, 80 to 92 mm.; antennae, 20 to 22 mm.

Fulvous to fulvo-ferruginous, with head occasionally sulphur-yellow; wings hyaline or slightly tinged with fulvous.

This species resembles *E. macrurus*, but the abdomen is more slender, and it may be readily recognized by the angularly broken radial vein.

Described from three female cotypes from Porto Rico.

Habits.—This species evidently preys upon a number of lepidopterous larvæ. The writer has recently bred it from black woolly-bear caterpillars at Mayaguez, Porto Rico. The

oval pupa of dark brown silk, 12 mm. long by 6 mm. broad, is formed within the skin of the host several days subsequent to its death. One larva spun up in this way on February 13 and the adult emerged March 15, a period of thirty-one days being required for the transformation.

Location of specimens.—Cotypes: American Entomological Society (Academy of Natural Sciences, Philadelphia); Agricultural Experiment Station, Mayaguez, Porto Rico; Massachusetts Agricultural College.

Distribution.—Porto Rico.

***Eremotylus tenuigena* Kriechb.**

Eremotylus tenuigena Kriechbaumer, Zeitchr. Syst. Hym. Dipt.,
p. 153, Santos, Brazil.....1905.

“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
36, n. 7.....1905.

Fulvous, head in part and scutellum flavous, apical half of antennæ fuscous; mesonotum with three carinæ; metanotum with two lateral subtriangular fuscous spots; the head roundly narrowed behind the eyes; ocelli large, close to tops of the eyes.

Length, 23–25 mm.; antennæ, 27 mm.

Fulvous; head varied with flavous; face narrow; cheeks narrow, flattened; face and clypeus together twice as long as broad; ocelli large, well separated, close to tops of eyes, arranged as an isosceles triangle; apical two-fifths of antennæ fuscous, especially above.

Mesonotum with two longitudinal furrows converging on the scutellum, dividing it into three lobes: keels more or less distinct on the lateral lobes; scutellum flavous, with lateral keels connecting it with the mesothorax in front with an inconstant rounded lateral fuscous spot at the base; metathorax short, with anterior transverse carina, sometimes stronger in the middle, running at the sides into a small protuberance; shallowly excavated behind, with irregular arcuate wrinkles and a varying bronze reflection most constant below, as well as an irregular, somewhat ragged lateral fuscous spot.

Wings with the base of the radial vein somewhat “drawn out.”

This species resembles *E. (Allocamptus) undulatus* Grav. I have not seen a specimen, but give a free translation of the unfortunately incomplete original description from the German.

Type.—Collection of Dr. Hans Brauns.

Distribution.—Santos, Brazil.

This species is evidently semitropical, as the type was taken at Santos, Brazil, just south of the Tropic of Capricorn.

Eremotylus arctiæ Ashm.

<i>Ophion arctiæ</i>	MS., Riley and Howard, Insect Life, III, p. 155.....	1890.
“ “	MS., Lintner, Seventh Rept. N. Y. State Ent., p. 228	1891.
<i>Eremotylus arctiæ</i>	Ashmead, Trans. Amer. Ent. Soc., Vol. 23, p. 192, ♀ ♂, Orig. descr	1896.
“ “	Morgan, La. Expt. Sta., Bull. 48 (Ser. 2), p. 159 (<i>Ophion macrurum</i>).....	1897.
“ “	Ashmead, Smith's Ins. N. J., p. 580.....	1900.
“ “	Dalla Torre, Cat. Hym., III, p. 184.....	1901.
“ “	Morgan, U. S. Office Expt. Sta., Bull. 99, p. 183, pl. 3, fig. C.....	1901.
<i>Enemotylus</i>	“ Eliot and Soule, Caterpillars and their Moths, p. 57	1902.
<i>Eremotylus</i>	“ Felt, N. Y. State Mus., Bull. 76, Nineteenth Rept. State Ent., p. 105.....	1904.
“ “	Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 36, n. 8	1905.
“ “	Viereck, Smith's Ins. N. J., p. 620.....	1910.

Fulvo-ferruginous; wings hyaline; radial vein slender at base, thickened beyond, not flexed; discocubital vein arcuate, its outer two-thirds nearly parallel with the subdiscoidal vein, outer half of third discoidal cell not enlarged, a large irregular glabrous area present in the discocubital cell.

Length, 12-28 mm.; wing, 12-21 mm.; spread, 26-44 mm.; antennæ, 10-25 mm.

Head fulvo-ferruginous or frequently flavous; vertex flavous; ocelli large, prominent, well separated, black, each frequently with an outer ring of flavous; eyes black, emarginate; antennæ long, filiform, fulvo-ferruginous, with a small indistinct median tubercle below and between the antennal fossæ; clypeal foveæ distinct; maxillæ bidentate, tipped with black.

Thorax opaque; mesonotum smooth, with indistinct parapsidal furrows converging towards the scutellum; scutellum convex, hollowed in front and connecting with the mesonotum by lateral keels; metathorax flattened behind, slightly hollowed above the insertion of the abdomen; with an anterior transverse carina, in front of which it is smooth, behind wrinkled; with a weak median longitudinal furrow and several arcuate carinæ originating at the insertion of the abdomen.

Wings hyaline; radial vein slender at base, thickened beyond, not flexed; discocubital vein arcuate, the outer two-thirds nearly parallel with the subdiscoidal vein; third discoidal cell of nearly equal width throughout; discocubital cell with a large irregular glabrous area; nervulus well antefurcal to interstitial; nervellus broken well above the middle; legs of the general color or frequently lighter; claws pectin-

ate; abdomen fulvo-ferruginous, sometimes almost fuscous, strongly compressed.

Redescribed from type and numerous specimens of both sexes.

Type.—♀. No. 3296, U. S. National Museum.

The questionable stability and reasons for restricting the species are discussed under *E. macrurus* L. The existence of light specimens of *macrurus* with hyaline wings has led to considerable confusion. A large series of specimens shows at once that *macrurus* is quite variable in such characters as color, venation and size. The hyaline wings and arcuate shape of the discocubital vein in *arctiæ* seem to be well fixed, and for this reason I have retained the species, drawing the limits closer. Breeding experiments may perhaps show that *arctiæ* is only a subspecies of *macrurus*.

Distribution.—This species ranges through southern Canada, the United States and northern Mexico, from Ottawa, Canada, and Amherst, Mass., to Georgia, Mississippi and California. It appears to have a more limited range than *E. macrurus*, being more restricted to the southern United States. Owing to confusion with the latter, and the present narrowing of the species, many of the records are uncertain, but it has been reported from the following places: Ottawa, Can.; Amherst, Mass.; Vineland, N. J.; Pennsylvania; Washington, D. C.; Tennessee; Jackson, S. C.; Mississippi; Selma, Ala.; Santa Cruz Mountains and Alameda County, Cal. I have seen specimens from the following locations: Harrisburg, Pa.; Tennessee; Tifton, Ga.; Thomasville, Ala., February 12, and Dallas, Tex., April 8; Baldwin and Onaga, Kans.; Indiana; Los Angeles and Stanford University, Cal.

Life history and habits.—Little is recorded of the life history of this species, but so far as known it agrees with that of *E. macrurus*. It preys for the most part on some of the arctians, though it has been reared from saturnians. The cocoon of one specimen from California shows that the parasite spun up and pupated within the body of its host, *Halisidota agassizii*, but this habit is probably variable. In this

case the host evidently died before it could spin up, for the cocoon filled the body cavity and stretched the skin tightly. The imago is of medium size, hence the cocoons may be considered fairly typical, though they will be found to vary somewhat in size. The cocoon is elongate-oval in shape, 16 mm. long and 17 mm. broad, made of dirty-gray silk.

Economic importance.—This species is known to be parasitic upon a number of arctians and saturnians, but its real value can not be estimated since the reports are brief and scattered.

Hosts.

Attacus bolinae. Specimens in United States National Museum.

Automeris (Saturnia) io Fabr. Ashmead, Trans. Amer. Ent. Soc., Vol. 23, p. 192, Vineland, N. J.

Callosamia promethea Drury. Felt, N. Y. State Mus., Bull. 76, p. 105.

Diacrisia (Arctia) virginica Fabr. Ashmead (Jackson, Miss.), Trans. Amer. Ent. Soc., Vol. 23, p. 192.

Ecpantheria deflorata (scribonia) Fabr. Riley and Howard, Ins. Life, III, p. 155, Columbia, S. C.

Halisidota agassizii Pack. Specimen from Los Angeles, Cal., in U. S. National Museum.

Isia (Pyrrharctia) isabella Abb. and Sm. Riley and Howard, Ins. Life, III, p. 155, Thomasville, Ga.

Eremotylus macrurus (Linn.).

(Plate II, fig. 10.)

- Ichneumon macrurus* Linné., Syst. Nat., ed. 12, Vol. I, pt. 2, app.....1767.
- “ “ Drury, Illustr. Nat. Hist., I, pp. 97, 132, pl. 43, fig. 5.....1770.
- “ “ Ph. L. Müller, Linné.; Vollst. Natursyst. Suppl., p. 319, n. 54.....1776.
- “ *luteus americanus* Christ, Nat. Syst. Ins. Hym., p. 358, pl. 27, fig. 5.....1791.
- Ophion glabratus* Say, Boston Journ. Nat. Hist., I, p. 239 (Le Conte ed., II, p. 695). Type lost.....1835.
- “ *macrurus* Westwood, Drury's Illustr. Nat. Hist., ed. 2, I, p. 92, pl. 43, fig. 5.....1837.
- “ *rugosus* Brullé, Hist. Nat. Ins. Hym., IV, p. 138, n. 1.....1846.
- “ *macrurum* Emmons, Nat. Hist. N. Y., V, p. 196, pl. 27, fig. 6.....1854.
- “ *glabratus* Cresson, Proc. Ent. Soc. Phila., I, p. 2061862.
- “ “ Norton, Idem, p. 358.....1863.

<i>Ophion cecropiæ</i>	Scudder, Bost. Soc. Nat. Hist., IX, p. 188.....	1863.
“ <i>macrurum</i>	Norton, Proc. Ent. Soc. Phila., I, p. 359, n. 6.....	1863.
“ <i>cecropiæ</i>	Sanborn, Tenth Ann. Rept. Mass. State Bd. Agr., p. 169.....	1863.
“ <i>macrurum</i>	Trouvelot, Amer. Nat., I, p. 89, fig. 1.....	1868.
“ <i>macrurus</i>	Smith, Trans. Ent. Soc. London (3) VI, Proc., p. 32.....	1868.
“ <i>macrurum</i>	Packard, Guide to Study of Ins., p. 195, fig. 27.....	1869.
“ “	Riley, Amer. Ent., II, p. 100, figs. 63, 64.....	1870.
“ “	Chambers, Idem, p. 156.....	1870.
“ “	Cresson, Trans. Ent. Soc. Phila., IV, p. 169, Texas	1872.
“ “	Riley, Fourth Ann. Rept. Ins. Mo., p. 107, figs. 37, 38.....	1872.
“ <i>mexicanus</i>	Cresson, Proc. Acad. Nat. Sci. Phila., p. 374.....	1873.
“ <i>macrurum</i>	Saunders, Fifth Rept. Ent. Soc. Ontario, p. 25, figs. 20-21.....	1874.
“ “	Cresson, Geol. and Geog. Surv. Terr. Rept. Zool., V, p. 708.....	1875.
“ “	Saunders, Sixth Rept. Ent. Soc. Ontario, p. 42, fig. 29.....	1875.
“ “	Worthington, Can. Ent., VIII, p. 220, October.....	1876.
“ “	“ Idem, IX, p. 60.....	1877.
“ “	French, Seventh Rept. Ins. Ill, p. 194.....	1878.
“ “	Provancher, Nat. Can., XI, p. 117.....	1879.
“ “	Riley, Amer. Ent., III, p. 134, fig. 52.....	1880.
“ “	Packard, Half Hour Rec. in Nat. Hist., p. 220, fig. 170.....	1881.
“ “	Saunders, Can. Ent., XIV, p. 43, fig. 7.....	1882.
“ “	Clarkson, Can. Ent., XV, p. 162.....	1883.
“ “	Saunders, Ins. Inj. to Fruits, pp. 78, 175, 212, figs. 73, 74 (ed. 2, 1889; ed. 3, 1900).....	1883.
“ “	Provancher, Faun. Ent. Can., II, p. 350, n. 1, ♀ ♂	1883.
“ “	Comstock, Kingsley's Stand. Nat. Hist., II, p. 515, fig. 643.....	1884.
“ “	Weed, Papilio, IV, p. 112.....	1884.
“ “	Waterhouse, Trans. Ent. Soc. Lond., Proc., p. XXIII.....	1887.
“ “	Packard, Entomology for Beginners, p. 168, fig. 213	1888.
“ “	Fallou, Ann. Ent. Soc. France, IX, Bull., pp. 132, 151	1889.
“ “	Coquillett, Ins. Life, I, p. 286.....	1889.
“ “	Webster, Ins. Life, II, p. 383.....	1890.

- Ophion macrurum* Ashmead, Colo. Biol. Assn. Bull., I, p. 43.....1890.
 " " Riley and Howard, Ins. Life, III, p. 154, host list.....1890.
 " *glabratum* Riley and Howard, Idem, p. 155, parasitic on *Hyphantria cunea*.....1890.
 " *macrurum* Bruner, Nebr. Agr. Exp. Sta., Bull. 14, pp. 14, 15, figs. 4, 5.....1890.
 " " Perkins, Eleventh Rept. Vt. State Bd. Agr., p. 196, fig. 361890.
 " " Ashmead, Smith's Cat. Ins. N. J., p. 25.....1890.
 " *glabratum* Ashmead, Idem, p. 25.....1890.
 " *macrurum* Lintner, Seventh Rept. Ins. N. Y., p. 228.....1891.
 " " Harrington, Twenty-first Rept. Ent. Soc. Ont., p. 67, fig. 31.....1891.
 " " Osborn, Part. Cat. Anim. Iowa, p. 151.....1892.
 " " Riley, U. S. Nat. Mus., Bull. 39, Part F, fig. 611893.
 " " Webster, Ohio Exp. Sta., Bull. 45, p. 172, figs. 8, 9.....1893.
 " " Smith, Rept. N. J. Exp. Sta., p. 582, fig. 167.....1893.
 " " Fyles, Twenty-fifth Rept. Ent. Soc. Ont., p. 55, fig. 38, transformations within host (*Sa-turnidæ*).....1894.
 " " Smith, Econ. Ent., p. 382, fig. 4401896.
 " " Evans, Can. Ent., Vol. 28, p. 10, listed.....1896.
 " " Webster, Ohio Exp. Sta., Bull. 86, p. 33, fig. (2).....1897.
Orphion " Morgan, La. Agr. Exp. Sta., Bull. 48 (Ser. 2), p. 159, fig. bred from *Artace punctistriga*.....1897.
Ophion " Ashmead, Smith's Ins. N. J., p. 580, fig. 273.....1900.
 " *macrurus* Dalla Torre, Cat. Hym., III, p. 1941901.
Eremotylus druryi Kriechbaumer, Zeitschr. Syst. Hym. Dipt., I, p. 152.....1901.
Enemotylus macrurus Eliot and Soule, Caterpillars and their Moths, p. 57.....1902.
Eremotylus " Felt, N. Y. State Mus., Bull. 76 (Nineteenth Rept. State Ent.), pp. 100-107, pl. 2, fig. 6, life hist., hosts, etc.....1904.
Ophion macrurum Howard, Insect Book, Plate IX, fig. 8.....1904.
Allocaaptus macrurus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 36, n. 51905.
 " *druryi* Szepligeti, Idem, p. 36, n. 9.....1905.
Eremotylus macrurus Brues, Journ. Econ. Ent., I, p. 124.....1908.
 " *macrurum* Smith, Journ. Econ. Ent., I, p. 295.....1908.
Ophion macrurum Fiske and Thompson, Journ. Econ. Ent., II, p. 453.....1909.

Fulvo-ferruginous; wings more or less tinged with fulvous; radial vein with base thickened and flexed; discocubital vein slightly sinuous; outer half of third discoidal cell enlarged.

Length, 22-38 mm.; wing, 15-27 mm.; spread, 32-57 mm.; antennæ, 18-33 mm.

Fulvo-ferruginous, varied to light flavous, clothed with fine, short pubescence; face, vertex and occiput frequently flavous; eyes large, black, emarginate; ocelli prominent, black, with an outer ring of flavous; antennæ long, slender; face with a more or less distinct median carina running from the anterior ocellus to or below the antennal fossæ; in one specimen forked at both ends but generally simple and often indistinct; mandibles bidentate, tipped with black.

Thorax of the general color, opaque, finely and densely punctured; mesonotum smooth, sometimes with three longitudinal fuscous stripes; parapsidal furrows shallow; scutellum prominent, convex, hollowed in front, with more or less distinct lateral keels. Metathorax flattened behind, its anterior, transverse carina irregular in shape, nearly straight, angularly bent or sinuous, often notched in the middle; the surface in front is smooth, behind irregularly rugose, with a shallow, more or less distinct median furrow, and several arcuate carinæ originating about the insertion of the abdomen; sides of metathorax reticulate.

Wings generally more or less tinged with fulvous, sometimes hyaline; nervulus well antefurcal to interstitial; nervellus broken well ~~below the middle~~; radial vein thickened at the base and sinuate, with a small glabrous area below its base in the discocubital cell; discocubital vein slightly sinuate, the outer half of the third discoidal cell noticeably wider; first recurrent shorter, sometimes much shorter than the second; legs of the general color or somewhat lighter; claws pectinate; abdomen fulvo-ferruginous, sometimes more or less fuscous and darker toward the apex, strongly compressed.

In redescribing this species I have examined over a hundred specimens from all parts of the country.

Type.—Location unknown.

E. macrurus shows considerable variation in coloration of the body and wings, shape of the radial vein and anterior transverse metathoracic carina, number of frenal hooks, size, etc. Most specimens taken north of Mexico have wings more or less tinged with fulvous, while in the majority of Mexican specimens I have seen they are hyaline. Some specimens, however, taken even as far north as Ottawa, Canada, though otherwise characteristic *macrurus*, have hyaline wings. The existence of specimens varying in this way

has led to considerable confusion with *E. arctiæ* Ashm. Dr. Ashmead gave with the original description of *arctiæ* a number of characters which he thought separated *macrurus* and *arctiæ*, but a good series of both shows that many of these are not constant. I have before me a series of *macrurus* showing a complete gradation from a condition where the wings are entirely fulvous to one where they are completely hyaline. In this gradation the fulvous tinge seems to be most permanent at the base of the wing, the clearing beginning at the apex and working towards the body. The number of frenal hooks varies from 7 to 15 and even with the same individual. The type of *arctiæ* has 9 frenal hooks on one side and 11 on the other, and similar variation is common. Too much weight has been laid upon the number of frenal hooks, which, as is thus shown, varies widely. Variation in the form of the anterior transverse metathoracic carina has already been noted in the description. Two characters are, however, apparently quite constant and contrasting in *macrurus* and *arctiæ*; in the former the outer half of the third discoidal cell is markedly widened and the discocubital vein therefore somewhat sinuous; in the latter this cell is of nearly equal width throughout and the discocubital vein is evenly arcuate, its outer half—along the third discoidal cell, nearly parallel with the subdiscoidal nervure. In *arctiæ* the radial vein is narrowed at the base and thickened beyond, while in *macrurus* it is evidently thickened to the stigma. I have seen no specimens of *arctiæ* with this characteristic venation which showed any trace of fulvous in the wings. Some writers have included the smaller specimens—which I place in *macrurus*—with hyaline wings, in *arctiæ*, but they have characteristic *macrurus* venation and the other characters are not constant, as is shown by a series of these specimens. If these are not included in *macrurus*, *arctiæ* Ashm. can not be considered more than a weak subspecies. This question can not be settled absolutely until breeding experiments have been made, but for the present it seems wise to retain *arctiæ* in a restricted sense. There is little doubt that *Ophion glabratus* Say is a synonym of *macrurus*, but since Say's type is lost this can not be abso-

lutely proven. However, several of the smaller specimens of *macrurus* with hyaline wings answer Say's description in all respects. *E. druryi* Kriechbaumer is, in all probability, also a synonym of *macrurus* as comparison of the description with specimens shows; the wings and dark reddish color of the body point unmistakably to *macrurus*, and the fact that the specimens were taken well within the range of *macrurus* (New York) confirms this belief. The very name given by Christ, "The American Yellowbeak," suggests *macrurus*. If any such species, differing from *macrurus*, existed in the State of New York, it would certainly appear in some of the American collections. The fact that the specimens of *E. druryi* were bred from *Platysamia prometheas*, *Samia cynthia* and *Telea polyphemus* adds to the certainty.

I was greatly surprised to find that *Ophion mexicanus* Cresson, which has been placed in the Genus *Enicospilus*, is apparently a synonym of *macrurus*. The hyaline membranaceous spots which Cresson mentions in the discocubital cell are only colorless thickenings which appear frequently in *E. macrurus* and can not be called maculæ. After careful examination of this type I can not consider *mexicanus* even a subspecies of *macrurus*. The specimens which Cameron figures and partially describes as *mexicanus* are evidently some other species belonging in the Genus *Enicospilus*. Cresson described *mexicanus* as follows:

"Female. Large, luteous yellow, shining, clothed with a very short, pale pubescence; head pale, mandibles and palpi tinged with fulvous, tips of mandibles dusky; eyes large, pale; ocelli very prominent, whitish; antennæ as long as the body, dusky fuscous thorax; opaque; mesothorax flattened, with three subobsolete longitudinal fulvous stripes; scutellum yellow; metathorax obliquely flattened posteriorly with coarse arcuate and oblique striæ and a transverse sinuate carina near the base; tegulæ pale; wings hyaline, nervures fulvous, inner radial nerve incrassate towards the stigma and recurved, membranaceous spots in first submarginal cell hyaline, consisting of a cuneiform spot and beneath it a narrow curved line, broadly dilated towards the apex of the wing; legs slender, femora darker in color than the remainder; abdomen tinged with brown, first segment slender, slightly and gradually dilated at the apex.

"Length, 1 inch."

Distribution.—This species has a wide range from Ottawa, Canada, over the whole United States from Maine to California and Florida, more or less of Mexico, Trinidad, and probably other of the West Indian Islands.

Life history and habits.—This species, commonly known as "the long-tailed Ophion," and well represented in most collections throughout the United States, is the largest American member of the genus. It is an active diurnal insect rarely if ever attracted to light. Adults have been taken from March 2 to October 18, but the majority appear during April, May and June. The egg-laying habits and life history have already been treated so far as known. It is often referred to as a parasite and frequently bred from the larger saturnians and arctians. Eight or ten eggs are often laid externally on a caterpillar, but as there is only food enough for one, all but the strongest die in the struggle. As the host spins a stout cocoon the larva of *macrurus* does not need to look for further protection and spins up or sometimes simply pupates within the cocoon of its host. The cocoon when spun is tough, oval, about 32 mm. long by 17 mm. broad, and occupies the greater part of that spun by the host. The silk is fastened together by a dark secretion giving the outside a dark brown color, but with a faint yellowish or gold band around the middle. The interior is thinly lined with a transparent substance giving a bright metallic luster. The mature larva normally hibernates in the cocoon and the adults usually emerge in the spring, but occasionally individuals appear in the autumn.

Economic importance.—*E. macrurus* is without doubt the most important member of this genus, being quite abundant and always fatal to its host. Dr. Weed records an instance where thirty out of fifty pupæ of *Samia columbia* Sm. were parasitized by this insect, and in another two-thirds the pupæ of *Callosamia promethea* were affected, while Fiske and Thompson report that it affected 32.7 per cent. of *Promethea*, 7.3 per cent. of *Cecropia* and 10 per cent. of *Polyphemus*. Its value as a parasite is somewhat modified by the fact already mentioned that "the larvæ often fail to make proper pupæ, due probably to some disease which reaches

them within the body of the host." This does not prevent the parasite from killing the host but checks its own increase. Investigations at the Gypsy Moth Laboratory show that when the host is attacked by more than one parasite, *macrurus* is frequently the subject of secondary parasitism.

Hosts.

- Apatelodes torrefacta* Sm., Virginia. Riley, Ins. Life, III, p. 154...1890.
Artace punctistriga Walk. Morgan, La. Exp. Sta., Bull. 48, p. 159.....1897.
Automeris io Fabr. Felt, Nineteenth Rept. N. Y. St. Ent., p. 102.....1904.
Callosamia promethea Dr. Webster, Ins. Life, II, p. 383; Felt, Nineteenth Rept. N. Y. St. Ent., p. 103; Fiske and Thompson, Journ. Econ. Ent., II, p. 453.
Hyphantria cunea Dr. Riley and Howard, Idem, III, p. 155 (*O. glabratum*)1890.
Samia columbia Sm. Felt, Nineteenth Rept. N. Y. St. Ent., p. 1021904.
Telea polyphemus Cram., March 8; May 8.
Philosamia cynthia Dr., March 8.
Isia isabella, Abb. and Sm., March 8.
Samia cecropia L., October 2.

Location of specimens.—Specimens will probably be found in most collections in the United States, but certainly in the following: American Entomological Society, Pennsylvania, February 9; Michigan; Texas; Florida; Mexico; Rhode Island; Illinois. Boston Society of Natural History. New York. Leland Stanford, Jr., University, Cal., June 2 and June 9. Massachusetts State College, Massachusetts; New Hampshire; Mexico. Museum of Comparative Zoology, Pennsylvania; Texas. Minnesota State College, Minnesota; Maryland. Munich Entomological Museum, New York, September 15. North Carolina State College, North Carolina. New Hampshire State College, New Hampshire, May 13. Rutgers College, New Jersey. New York State Museum, Albany, N. Y. Pennsylvania State Museum, Pennsylvania, April 12 and 19, May 16 and 25, September 13; New York. U. S. National Museum, Washington, D. C.; Florida; Arkansas; Indiana; Cordoba, V. C. Mexico, January 24, 1908.

Eremotylus texanus (Ashm.).

Plate III, fig. 16.

<i>Thyreodon texanus</i>	Ashmead, Proc. U. S. Nat. Mus., Vol. 12, p. 422, ♂.....	1890.
"	" Trans. Amer. Ent. Soc., Vol. 23, p. 193.....	1896.
"	" Dalla Torre, Cat. Hym., III, p. 186.....	1901.
"	" Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 25, n. 22.....	1905.

Ferruginous; wings fuliginous to fuscous; body especially frequently marked with black; nervulus antefurcal; nervellus broken below the middle.

Length, 20-33 mm.; wing, 15-22 mm.; spread, 33-47 mm.; antennæ, 20-30 mm.

Ferruginous, varied with black and fulvous; head impunctate or finely punctured, clothed with fine, short, white pubescence, longer on the labrum; vertex of the general color—in one specimen black—eyes and ocelli black or dark brown; eyes emarginate, medium to small, distant from the base of the mandibles, clypeal foveæ deep; mandibles bidentate, tipped with black.

Thorax ferruginous to fulvo-ferruginous, shining, densely but finely punctured and clothed with fine, short pubescence; mesonotum with parapsidæ indistinct or lacking; scutellum deeply excavated in front, connected with the mesonotum by lateral carinæ; metathorax gradually sloping and slightly flattened behind, with median furrow and shallow arcuate carinæ originating about the insertion of the abdomen; a lateral carina at the edge of the posterior area bordered with a reticulate band; spiracles large, linear, surrounded by a groove.

Wings light to dark fuliginous, somewhat lighter towards the apex; stigma flavous; nervures fuscous, nervulus antefurcal to interstitial, nervellus broken below the middle; radial vein slightly sinuate, a small glabrous area below its base in the discocubital cell; discocubital vein unevenly arcuate; the outer half of the third discoidal cell enlarged; legs fulvo-ferruginous, claws pectinate; abdomen of the general color, often varied with black beyond the first segment; in one specimen almost entirely black beyond the second; in another this color occupies the ventral half of the fourth and succeeding, while in the third the ventral half of the abdomen beyond the first segment is of this color.

In redescribing this species I have examined the type and eight specimens.

Type.—♀. No. 2053, U. S. National Museum, Texas.

A good species, easily separated from other members of this genus by the more or less distinctly fuliginous wings.

It was originally described by Ashmead as a *Thyreodon*, but he was not sure where it belonged as shown by his statement, after the description, that "the large stigma might exclude it from the genus *Thyreodon*." Later (Transactions American Entomological Society, Vol. 23) he states that *T. texanus* belongs to the genus *Eremotylus*. The general character, especially the shape of the radial and discocubital veins, the nervellus broken well below the middle and the presence of a stigma place it at once in the genus *Eremotylus*. It has been confused with *Ophion slossonæ*, but these two species can be easily distinguished by their venation which is typical of the two genera. It is apparently closely related to *E. infuscatus*.

Distribution.—Cypress Mills, Texas; Moscow Mountains, Idaho, July 8; Washington.

This species seems to have a somewhat limited range in the southern and western United States and northern Mexico. It has been taken at Cypress Mills, Texas; California; Moscow Mountains, Idaho, and Washington.

Nothing is known of the life history, habits or hosts of this species.

Location of specimens.—U. S. National Museum, type ♂, No. 2053, Texas; cotype ♂, Cypress Mills, Tex. American Entomological Society, homotype, western Texas; ♂, California. American Museum of Natural History, two ♂ homotypes, Moscow Mountains, Idaho, July 8. Massachusetts Agricultural College, homotype, ♀.

***Eremotylus infuscatus* (Tasch.).**

- Ophion infuscatus* Taschenberg, Zeitschr. f. d. Ges. Natur.,
Vol. 46, p. 429, n. 11.....1875.
" " Dalla Torre, Cat. Hym., III, p. 192, listed....1901.
Eremotylus infuscatus Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
36, n. 6.....1905.

Testaceous: base and apex of abdomen, occiput, most of the thorax, posterior coxæ and femora, more or less fuscous; ocelli large; wings subhyaline; nervellus broken far above the middle; discocubital vein arcuate, not appendiculate, inner part of the radius bent and thickened.

Length, 23 mm.

Testaceous; head, basal fourth of the antennæ and a part of the vertex joining the dark complex of the large ocelli, brown; occiput more or less fuscous; thorax almost entirely brown; mesonotum brown, shell-yellow, with three broad, confluent, fuscous stripes of which the lateral ones are noticeably shorter in front; prosternum brown on a yellow background; mesopleuræ, pleuræ and metathorax fuscous; metathorax with an anterior transverse carina, confluent at the sides with a lateral carina; the area in front of the transverse carina is smooth, that behind rugose.

Wings subhyaline, with fuscous nervures; base of radius thickened and bent; discocubital vein arcuate, not appendiculate; nervellus broken far above the middle; legs testaceous, the front pair light, while on the posterior ones only the coxæ and femora are browned and the apex of the tibiæ is marked above with little black spots.

Abdomen with the dorsum of the first three segments browned; the first only on the apical half, the third all except the apex; the fourth is shell-yellow throughout while the two following are browned throughout; the segments beyond this unfortunately are missing.

Type.—Location unknown.

I have not seen a specimen of this species, and can only give a free translation of the original description with such additions as can be gathered from Kriechbaumer's keys. It is apparently closely related to *E. texanus*, which may prove to be synonymous.

Distribution.—Brazil?

MISPLACED AND UNRECOGNIZED SPECIES, Etc.

Ophion analis Say.

Ophion analis Say, Contrib. Maclur. Lyc. Phila., II, p. 75, n. 2, ♀ ..1828.

" " Say, Writ. Th. Say, Le Conte ed., I, p. 379, n. 2...1859.

Anomalon analis Norton, Proc. Ent. Soc. Phila., I, p. 361, n. 14,

♀1863.

" *anale* Provancher, Nat. Can., XI, p. 143, n. 4, ♀ ♂.....1879.

" " " Faun. Ent. Can., Hym., p. 357, n.

4, ♀ ♂.....1883.

" " Dalla Torre, Cat. Hym., III, p. 162.....1901.

This species was placed in the Genus *Anomalon* by Norton, and his action has been accepted by all later writers.

? *Ophion atrata* Fabr. (D. T.).

Ichneumon atratus Fabricius, Spec. Ins., I, p. 436, n. 98.....1781.

" " " Ent. Syst., II, p. 179, n. 191.....1793.

Ophion " " Syst. Piez., p. 132, n. 51804.

<i>Pimpla atrata</i>	Dalman, Svensk. Vet. Akad. Handl., 46, p. 188, pl. 1.....	1825.
<i>Rhyssa</i>	“ Brullé, Hist. Nat. Ins., Hym., IV, p. 77, n. 1, pl. 40, f. 1.....	1846.
<i>Thalessa</i>	“ Provancher, Nat. Can., XII, p. 13, n. 1.....	1880.
<i>Megarhyssa atrata</i>	Dalla Torre, Cat. Hym., III, p. 479, Canada; United States.....	1901.

This species is common throughout the United States and recognized as belonging to the Genus *Megarhyssa*.

Ophion brachiator Say.

<i>Ophion brachiator</i>	Say, Boston Journ. Nat. Hist., I, p. 240, n. 5..	1835.
“	“ Le Conte, Writ. Th. Say, Entom., II, p. 695....	1859.
“	“ Dalla Torre, Cat. Hym., III, p. 188, America, Indiana	1905.

“ *Black; abdomen and feet yellowish; a petiolated second cubital cellule.*

“ Length, nine-twentieths of an inch.

“ Antennæ, first joint beneath, white; mandibles whitish, piceous at the tip; palpi white; wings hyaline; stigma slender, blackish; second cubital cellule rather large, quadrangular, more or less petiolated from the radial cellule; anterior recurrent nervure a little arcuate, not angulated and with a white bulla; second recurrent nervure rectilinear, with a white bulla; metathorax with an impressed longitudinal line and a transverse raised one at base; abdomen honey-yellow; first joint white at base, second joint blackish above; feet, posterior pair honey-yellow, tarsi blackish; intermediate pair white, with honey-yellow thighs; anterior pair white.”

Say adds: “ I place this in the Genus *Ophion* because of the compressed falcate abdomen, notwithstanding the existence of the second cubital cellule.” The species evidently does not belong in this genus, nor even in this tribe.

Distribution.—Indiana.

Ophion chloris Oliv.

<i>Ophion chloris</i>	Olivier, Encycl. Meth., Ins., VIII, p. 509, n. 4.....	1811.
<i>Paniscus chloris</i>	Norton, Proc. Ent. Soc. Phila., I, p. 364, n. 27....	1863.

This species is undoubtedly a member of the Genus *Paniscus*, and Norton states that “ There is very little doubt that this is the *O. geminatus* of Say.” Dalla Torre, however, preserves both species.

Ophion clathratus Br.

- Ophion clathratus* Brullé, Hist. Nat. Ins., Hym., IV, p. 137, n. 5.....1846.
 “ “ Dalla Torre, Cat. Hym., III, p. 188.....1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31, n. 94.....1905.

Luteous; antennæ nearly red; thorax with three dorsal fuscous stripes; metathorax with base smooth; apex reticulate

Length, 32 mm.

It is yellow, with antennæ red and the back of the metathorax ornamented with three broad indistinct brown lines. The metathorax is divided into two very unequal parts; the first is smooth with the posterior edge projecting and nearly straight; the second is uniformly flattened, bordered laterally by a projecting line (carina?) or sort of pad and surmounted by some very distinct oblique pads, of which the first two rise longitudinally on the middle. The abdomen is missing beyond the second segment.

Type.—Location unknown.

Undoubtedly an *Ophion*, but the description is too incomplete for specific recognition.

Distribution.—Guiana.

Ophion dentator Fabr.

- Ophion dentator* Fabricius, Syst. Piez., p. 138, n. 36.....1904.
 “ “ Olivier, Encycl. Meth., Ins., VIII, p. 515, n. 45...1811.
Ichneumon dentator Thunberg, Bull. Acad. Sci. St. Petersburg, VIII, p. 2721822.
 “ “ Thunberg, Mém. Acad. Sci. St. Petersburg, IX, p. 3411824.
Ophion dentator Dalla Torre, Cat. Hym., III, p. 189, Amer. mer..1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31, n. 96.....1905.

Thorax black, varied with flavous; abdomen banded; posterior femora one-toothed.

Habitat.—Amer. Merid.

Small, head flavous; antennæ and vertex black. Thorax flavous and black varied; dorsum (mesonotum) black, with two flavous lines. Abdomen petiolate, falcate, the slender first segment with the base flavous and apex black, the second black; the rest with the base flavous and apex black. Wings short, hyaline; marginal point (stigma) black. Feet flavous; the posterior femora with two black bands and towards the apex an acute projecting tooth.

Type.—Location unknown.

I doubt if the species belongs in this tribe.

Ophion dimidiator Fabr.

- Ophion dimidiator* Fabricius, Syst. Piez., p. 136, n. 31.....1804.
 “ “ Olivier, Encycl. Meth., Ins., VIII, p. 514, n. 38..1811.
Ichneumon demidator Thunberg, Bull. Acad. Sci. St. Petersburg,
 VIII, p. 262.....1822.
 “ “ Thunberg, Mém. Acad. Sci. St. Peters-
 bourg, IX, p. 314.....1824.
Ophion dimidiator Dalla Torre, Cat. Hym., III, p. 189, Amer.
 Mer.....1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31,
 n. 971905.

Flavous; antennæ black; abdomen fuscous; base flavous.

Habitat.—Amer. Merid.

Structure and size of *O. luteus*; head flavous; vertex black; antennæ black; thorax flavous, immaculate. Abdomen petiolate, falcate, compressed, the first and second segments ferruginous, the rest blackish. Feet flavous.

This description is too incomplete to make identification possible.

Ophion emarginatus Say.

- Ophion emarginatus* Say, Bost. Journ. Nat. Hist., I, 3, p. 245,
 n. 8; Comp. Wrs., II, p. 699 (1859).....1836.
Anomalon emarginatum Dalla Torre, Cat. Hym., III, p. 164.....1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc.,
 p. 13, n. 82.....1905.

This species has for some time been recognized as belonging to the Genus *Anomalon*.

Ophion extenuator Fabr.

- Ophion extenuator* Fabricius, Syst. Piez., p. 137, n. 35.....1804.
 “ “ Olivier, Encycl. Meth., Ins., VIII, p. 514, n. 44..1811.
Ichneumon extenuator Thunberg, Bull. Acad. Sci. St. Peters-
 bourg, VIII, p. 265.....1822.
 “ “ Thunberg, Mém. Acad. Sci. St. Peters-
 bourg, IX, p. 321.....1824.
Ophion extenuator Dalla Torre, Cat. Hym., III, p. 190, Amer.
 Mer.....1901.
 “ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p.
 31, n. 98.....1905.

Black; abdomen falcate, rufous; dorsum black, the anterior feet ferruginous.

Habitat.—Amer. Merid.

Structure entirely like *O. pugillator* but three times as small, and slender. Antennæ porrect, black, Head black, mouth whitish. Thorax immaculate black; abdomen slender, falcate, incrassate behind, red, with dorsum black; ovipositor exerted the length of the abdomen, with a shorter double sheath. Wings short, white; feet ferruginous.

The length of the ovipositor, "extending the length of the abdomen," seems to place this in a genus outside this tribe.

Ophion flavidus Br.

Ophion flavidus Brullé, Hist. Nat. Ins. Hym., IV, p. 143, n. 12.....1846.

" " Dalla Torre, Cat. Hym., III, p. 190.....1901.

" " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31,
n. 99.....1905.

Flavid, with abdomen and base of antennæ rufous; scutellum flavous; metathorax with two arcuate lines.

Length, 20 mm.

It is yellowish, with the antennæ, feet and underside of the abdomen reddish-yellow. The largest part of the abdomen is brown, especially below, and the edge of the segments. The face is more or less reddish in the middle; the head and scutellum are in general yellow. The mesothorax shows three more or less distinct brown lines. The nervures of the wings are brown, the stigma is yellow, the median vein (discocubital) is twice bent, the first angle is more or less prolonged on the inside. The metathorax little or not at all rugose, showing a shallow longitudinal groove in the second region, and a slightly arched, projecting carina more or less interrupted in the middle, running parallel to the edge of the first region. This line is a little stronger in the middle and on the sides.

Type.—Location unknown.

This description seems to contain no distinctive characters.

Distribution.—Brazil.

Ophion flavorufus Br.

Ophion flavo-rufus Brullé, Hist. Nat. Ins. Hym., IV, p. 144.....1846.

" *flavorufus* Dalla Torre, Cat. Hym., III, p. 191.....1901.

" " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31,
n. 102.....1905.

Ferruginous; head and scutellum flavous, face ferruginous; metathorax rugose, bilineate.

Length, 20 mm.

It is reddish ferruginous, with the head and scutellum sulphur-yellow and the face reddish ferruginous. The abdomen is brown, on the lower edges of the segments yellowish; the wings have brown nervures, the stigma part red and part brown; the median nervure (discocubital) biangular and the discoidal cell longer than high. The metathorax is punctured in front, reddish behind; its primary region at the posterior edge emarginate in the middle; oblique on each side in the manner of very open stripes. A more or less complete arched sinuous line crosses the second region.

Type.—Location unknown.

I have not seen a specimen which meets the requirements of this description, and can only give a translation of the original description, for it has not since been mentioned except in catalogue.

Distribution.—Brazil.

Ophion geminatus Say.

- Ophion geminatus* Say, Contrib. Maclur. Lyc. Phila., II, p. 76, n. 3. 1828.
 “ “ “ Comp. Writ. Th. Say, Ent., I, p. 379, n. 3. 1859.
Paniscus geminatus Norton, Proc. Ent. Soc. Phila., I, p. 364,
 n. 26.....1863.
 “ “ Cresson, Trans. Amer. Ent. Soc., IV, p.
 171, ♀ ♂.....1872.

This species was placed in the Genus *Paniscus* by Norton and his action has been accepted by all writers. It is common throughout the United States and superficially resembles some of the Ophions, but may be readily separated by the presence of an areolet in the anterior wings. Norton states that this species and *chloris* Oliv., 1828, are synonymous, but Dalla Torre preserves both species.

Ophion glaucopterus (Linn.) Fabr.

- Ichneumon glaucopterus* Linné, Syst. Nat., ed. 10 a, I, p. 566, n.
 53.....1758.
 “ “ Linné, Syst. Nat., 12 ed., I, 2, p. 938, n.
 57.....1767.
Ophion “ Fabricius, Suppl. Ent. Syst., p. 236, n. 4....1798.
 “ “ Olivier, Encycl. Meth., Ins., VIII, p. 510,
 n. 8.....1811.
 “ “ Gravenhorst, Nova Acta. Acad. Nat. Avios.,
 IX, p. 295.....1828.

<i>Paniscus glaucopterus</i>	Gravenhorst, Ichn. Europ., III, p. 633, n. 108.....	1829.
<i>Opheltes</i>	" Holmgren, Svenk. Vet. Akad. Handl., II, 2, p. 8 (Oph.), p. 30, n. 1.....	1858.
<i>Opheteles</i>	" Provancher, Faun. Ent. Can., Hym., p. 359, figs. 38, 39.....	1883.
<i>Opheltes</i>	" Cresson, Syn. Hym. N. Amer., p. 202.....	1887.
"	" Morley, The Entomologist, XLII, p. 137, ♀.....	1909.

Habitat.—Amer. bor.; Europe.

This species has long been recognized as a member of the Genus *Opheltes*.

***Ophion holosericeus* Tasch.**

<i>Ophion holosericeus</i>	Taschenberg, Zeitschr. Ges. Naturw., 46, p. 427.....	1875.
"	" Dalla Torre, Cat. Hym., III, p. 192.....	1901.
"	" Szepligeti, Gen. Ins., Hym., 34 ^{me} Fasc., p. 31, n. 103.....	1905.

Sericeous, rufous; scutellum flavous; apex of abdomen darker.

Length, 19 mm.

A fine white coat of hair covers the whole body, of which the red ground color is changed by the reflected light of the place; the apex of the abdomen is indistinctly, especially along the lower part, with brown; the scutellum, and also the posterior part of the head is frequently paler (more yellowish). The metanotum bears far forward a transverse carina, angularly broken in the middle, and running from there evenly back; behind this a weak parallel transverse carina, as well as median longitudinal lines which run back from the apex of the angle in the anterior transverse carina and gradually disappear. Below this is also a lateral carina running from the outer end of the stigma to the apex of the thorax, and a lateral boundary to mark the posterior half of the sloping part. From the hinder border of the large cell (discocubital) springs an appendix.

Specimens lying before me differ from the preceding [*O. pallipes*] through a slightly redder color and striking pubescence as well as through a much weaker posterior transverse carina on the metathorax.

I do not recognize this as any species with which I am acquainted.

Type.—Location unknown.

Distribution.—Parana, Brazil.

Ophion intricatus Br.

- Ophion intricatus* Brullé, Hist. Nat. Ins. Hym., IV, p. 143, n. 13...1846.
 " " Dalla Torre, Cat. Hym., III, p. 192.....1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 31,
 n. 104.....1905.

Rufous; face and scutellum flavous; metathorax with confused lines.
 Length, 20 mm.

It resembles the preceding—*O. flavidus*—except that the first line of the metathorax, on the edge of the first region, is strongly emarginated in the middle; the space between this border and the lesser line of the second region is divided into three parts by two raised lines; this lesser line is angulate, and the part nearest is surmounted by two longitudinal approaching lines. The second region of the metathorax is rugose. Finally, the discoidal cell is longer than broad while it is scarcely longer than broad in the preceding—*O. flavidus*.

This description is not sufficiently definite.

Type.—Location unknown.

Distribution.—Chile.

Ophion luteus (Linn.) Fabr.

- Ichneumon luteus* Linné, Sys. Nat., ed. 10a, I, p. 566, n. 51.....1758.
 " " Fabricius, Syst. Ent., p. 341, n. 751775.
 " " *americana*, Christ, Natur. d. Ins., p. 359, pl. 37,
 fig. 5, Amer.....1791.
Ophion " Fabricius, Suppl. Ent. Syst., p. 235, n. 1.....1768.
 " " Gravenhorst, Ichneumon. Europ., III, p. 692,
 n. 136, ♀ ♂.....1828.
 " " Curtis, Brit. Ent., XIII, p. 600, n. 1.....1836.
 " " Spinola, Gay's Hist. fis. y. pol. Chile, Zool.,
 VI, p. 516, n. 2, Chile1851.
 " " Taschenberg, Zeitschr. f. d. Ges. Naturw., 46,
 p. 426, n. 6, Amer.....1875.
Ophion luteus Bridgman and Fitch, Entomologist, XVII, p. 179, n. 2. 1884.
 " " Phillipi, Festschr. Ver. Natur. zu. Cassel, pp. 17,
 20, Chile (?).....1886.
 " " Riley and Howard, Insect Life, I, p. 155.....1888.
 " " Thomson, Opusc. Ent., Pt. 12, p. 1190. n. 1.....1888.
 " " Brauns, Arch. Naturg. Mecklenburg, 43, p. 90, n. 4.....1889.
 " " Dalla Torre,* Cat. Hym., III, p. 193.....1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 30, n. 28.....1905.
 " " Schmiedeknecht, Opusc. Ichn., XIX, p. 1441.....1908.

This species is found throughout Europe.

* Only a part of the extensive bibliography is given here, but all American references and the best European are included; the rest will be found in Dalla Torre, Cat. Hym., III, p. 193, 1901.

Ophion merdarius Grav.

- Ophion merdarius* Taschenberg, Zeits. f. d. Ges. Nat., 46, p. 435,
n. 22.....1875.
“ “ Wheeler, Psyche, VI, p. 545.....1893.

Taschenberg records this species, now placed in the Genus *Enicospilus*, from Illinois (North America), and Rosario (South America) taken from *Saturnia cecropia*. This is a well-known Old World species and the determination was probably a mistake.

Ophion mundus Say.

- Ophion mundus* Say, Bost. Journ. Nat. Hist., I, 3, p. 239, n. 3.....1836.
Anomalon flavipes Brullé, Hist. Nat. Ins. Hym., IV, p. 170, n. 1,
♀ ♂1846.
Ophion mundus Say, Compl. Writ. Th. Say. II, p. 695, n. 3.....1859.
Exochilum mundus Norton, Proc. Ent. Soc. Phila., p. 360, n. 10...1863.
“ “ Cresson, Proc. Acad. Nat. Sci. Phila., p. 375,
n. 1.....1873.

This species was placed in the Genus *Exochilum* by Norton, and his action has been accepted by all later writers.

Ophion nigrator Fabr.

- Ophion nigrator* Fabricius, Syst. Piez., p. 140, n. 46.....1804.
“ “ Olivier, Encycl. Meth., Ins., VIII, p. 517, n. 56...1811.
Ichneumon planator Thunberg, Bull. Acad. Sci. St. Petersburg,
VIII, p. 259.....1822.
“ “ Thunberg, Mém. Acad. Sci. St. Petersburg,
IX, p. 307.....1824.
Ophion nigrator Dalla Torre, Cat. Hym., III, p. 196, Amer. Mer...1901.
“ “ Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32,
n. 106.....1905.

Flavous; antennæ black; wings fuscous.

Habitat.—Amer. Merid.

Small; head flavous; antennæ, three ocelli and vertex, black; thorax rather flat, flavous, immaculate. Abdomen long, petiolate; apex compressed, flavous, shining; ovipositor short, incurved. Wings fuscous, feet flavous.

This description is too brief to be distinctive.

Ophion obscurus Fabr.

Taschenberg* records this species from Illinois, North America, and Mendoza, South America. It is a well-known Old World species, and as no other record of its capture exists it is probably due to an erroneous determination.

* Zeits. f. d. Ges. Naturw., 46, p. 426, n. 5, 1875.

Ophion pallipes Br.

- Ophion pallipes* Brullé, Hist. Nat. Ins. Hym., IV, p. 144, n. 15..1846.
 " " Taschenberg, Zeitschr. f. d. Ges. Naturw., 12, p.
 427, n. 7.....1875.
 " *pallidipes* Dalla Torre, Cat. Hym., III, p. 1971901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32,
 n. 1071905.

Dark ferruginous, tibiæ and tarsi red, wings flavid; base of meta-thorax hollowed out.

Length, 20 mm.

It is dark ferruginous with the legs and tarsi yellowish-red, and the segments of the abdomen bordered with black from the third. The hooks of the tarsi are black; the trochanters and trochantines yellowish-red; the wings are washed with yellow, with the nervures brown and the stigma yellowish-red; the median discocubital nervure is nearly biangular with an internal prolongation; the discoidal cellule is nearly as broad as long.

The lobes of the mesothorax are distinct, a little raised and slightly canaliculate. The metathorax is surmounted by two slightly sinuous projecting lines (carinæ) which divide it into three regions, of which the first is strongly excavated at the base with a longitudinal furrow, the second divided into three parts by two parallel, longitudinal lines, the third and last slightly longitudinally wrinkled. The first region alone is distinctly punctured.

Type.—Location unknown.

This description seems to lack the distinctive characters necessary for its recognition.

Distribution.—Brazil (Prov. des Mines).

Ophion pennator Fabr.

- Ophion pennator* Fabricius, Syst. Piez., p. 135, n. 24.....1804.
 " " Olivier, Encycl. Meth., Ins., VII, p. 513, n. 30...1811.
Ichneumon pellator Thunberg, Bull. Acad. Sci. St. Petersburg,
 VIII, p. 2621822.
 " " Thunberg, Mém. Acad. Sci. St. Petersburg,
 IX, p. 314.....1824.
 " *pennator* Cresson, Trans. Amer. Ent. Soc., VI, p. 209..1877.
Ophion " Dalla Torre, Cat. Hym., III, p. 197, Amer.,
 Georgia.....1901.
 " " Szepligeti, Gen. Ins., Hym., 34^{me} Fasc., p. 32,
 n. 118.....1905.

Rufous; head and anus black, wings fuscous.

Habitat.—Amer. Merid.

In structure and size entirely like *O. pugillator*; head with antennæ black; thorax fuscous, immaculate. Abdomen compressed, falcate; apex truncate, black; ovipositor short, exserted. Wings fuscous, with two small hyaline spots in the anterior part.

Olivier gives a similar description, but Mr. E. T. Cresson believes that it "is probably *Trogus exesorius* Br."

Ophion quadrator Fabr.

<i>Ophion quadrator</i>	Fabricius, Syst. Piez., p. 137, n. 32.....	1804.
" "	Olivier, Encycl. Meth., Ins., VIII, p. 514, n. 39.....	1811.
<i>Ichneumon quadrator</i>	Thunberg, Bull. Acad. Sci. St. Petersburg, VIII, p. 262.....	1822.
" "	Thunberg, Mém. Acad. Sci. St. Petersburg, IX, p. 315.....	1824.
<i>Ophion</i>	" Dalla Torre, Cat. Hym., III, p. 198, Amer. Mer.....	1901.
" "	Szepliget, Gen. Ins., Hym., 34 ^{me} Fasc., p. 32, n. 108.....	1905.

Flavous; second abdominal segment black, apex of wings black.

Habitat.—Amer. Merid.

Smaller than the preceding, *O. dimidiator*. Head flavous; antennæ black, the first segment flavous. Thorax immaculate flavous.

Abdomen petiolate, falcate, slender; the first segment obscure ferruginous, the second black, the third black above, the rest flavous.

Wings hyaline, apex black; feet flavous, the posterior black.

This description is too indefinite to make recognition possible.

Ophion quæstor Fabr.

<i>Ophion quæstor</i>	Fabricius, Syst. Piez., p. 132, n. 6.....	1804.
" "	Olivier, Encycl. Meth., Ins., VIII, p. 510, n. 10.....	1811.
<i>Ichneumon quæstor</i>	Thunberg, Bull. Acad. Sci. St. Petersburg, VIII, p. 259.....	1822.
" "	Thunberg, Mém. Acad. Sci. St. Petersburg, IX, p. 307.....	1824.
<i>Ophion</i>	" Dalla Torre, Cat. Hym., III, p. 198, Amer. Mer.....	1901.
" "	Szepliget, Gen. Ins., Hym., 34 ^{me} Fasc., p. 32, n. 109.....	1905.

Flavous; thorax with three oval raised fuscous tubercles.

Habitat.—Amer. Merid.

A little smaller than *luteus*. Head flavous; antennæ darker, the first segment flavous; thorax flavous, with three anterior, raised, oval fuscous tubercles; abdomen petiolate, falcate, flavous, apex trun-

cate; dark, the exerted ovipositor very short; wings hyaline; feet flavous.

This description is too incomplete to make recognition possible.

Ophion relictus Fabr.

<i>Ophion relictus</i>	Fabricius, Ent. Syst. Suppl., p. 236, n. 5.....	1798.
" "	" Syst. Piez., p. 133, n. 12.....	1804.
" "	Olivier, Encycl. Meth., Ins., VIII, p. 511, n. 18....	1811.
<i>Ichneumon relictus</i>	Thunberg, Bull. Acad. Sci. St. Petersburg, VIII, p. 262	1822.
" "	Thunberg, Mém. Acad. Sci. St. Petersburg, IX, p. 314.....	1824.
<i>Anomalon</i>	" Norton, Proc. Ent. Soc. Phila., I, p. 360, n. 13, ♀ ♂.....	1863.
" <i>relictum</i>	Provancher, Nat. Can., XI, p. 143, n. 3, fig. 5, ♀ ♂	1879.
" "	Provancher, Faun. Ent. Can., Hym., p. 357, n. 3, fig. 37.....	1883.
" "	Dalla Torre, Cat. Hym., III, p. 169.....	1901.

This species was placed in the Genus *Anomalon* by Norton, and his action has been accepted by all later writers.

Ophion spinator Fabr.

<i>Ophion spinator</i>	Fabricius, Syst. Piez, p. 138, n. 37.....	1804.
" "	Olivier, Encycl. Meth., Ins., VIII, p. 515, n. 46....	1811.
<i>Ichneumon spinator</i>	Thunberg, Bull. Acad. Sci. St. Petersburg, VIII, p. 262	1822.
" "	Thunberg, Mém. Acad. Sci. St. Petersburg, IX, p. 313.....	1824.
<i>Ophion</i>	" Dalla Torre, Cat. Hym., III, p. 199, Amer. Merid.....	1901.
" "	" Szepliget, Gen. Ins., Hym., 34 ^{me} Fasc., p. 32, n. 111.....	1905.

Posterior of the thorax and base of the abdomen black, posterior femora one-toothed

Habitat.—Amer. Merid.

Smaller than the preceding (*O. dentator*), head dark red, antennæ black; thorax red in front, black behind; abdomen petiolate, falcate, the first and second segments black, the rest red; ovipositor exerted, black. Wings white, with a black marginal spot. Feet rufous, the posterior femora with a small acute tooth.

I fail to recognize this description as that of any *Ophion* I have seen.

Ophion undulatus Grav.

Taschenberg* records this species, now placed in the Genus *Allocamptus*, from Brazil, and North America, taken from *Saturnia* (*Samia*) *cecropia*. It is a well-known Old World species, and as no other record of its capture in America exists, the determination was probably erroneous.

* Zeitsch. f. d. Ges. Naturw., 46, p. 430, n. 12, 1875.

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EXPLANATION OF PLATES.

The figures on the following plates were prepared by the author as camera lucida drawings, and lack of bilateral symmetry is therefore due to the angle at which the object was viewed.

PLATE I.

FIG.

1. Side view of thorax of *Ophion bilineatus*.
 - a. prothorax.
 - a1. collar.
 - a2. lateral projection.
 - ab. insertion of abdomen.
 - ac. anterior coxa.
 - b. mesothorax.
 - b1. mesonotum.
 - b2. mesopleuron.
 - b3. transverse furrow.
 - b4. scutellum.
 - c. metathorax (proper).
 - c1. postscutellum.
 - c2. metapleuron.
 - c3. metathoracic epimeron.
 - d. median segment or metathorax (of descriptions).
 - h. insertion of head.
 - mc. median coxa.
 - pc. posterior coxa.
 - t. tegula.

FIG.

2. Abdomen of *Ophion bilineatus* (female).
- 1-7. abdominal plates.
- ce. cerci.
- o. ovipositor.
- s. sheath.

FIG.

3. Dorsal view of thorax of *Ophion bilineatus*.
 - a. prothorax.
 - a1. collar.
 - a2. lateral projection.
 - ab. insertion of abdomen.
 - aw. anterior wing.
 - b. mesothorax.
 - b1. mesonotum.
 - b2. mesopleuron.
 - b3. transverse furrow.

FIG.

- b4. scutellum.
- c. metathorax (proper).
- c1. postscutellum.
- c2. metapleuron.
- c3. metathoracic epimeron.
- d. metathorax (of descriptions) or median segment, showing three transverse carinæ.
- h. insertion of head.
- pc. posterior coxa.
- pw. posterior wing.
- t. tegula.

FIG.

4. Front view of head of *O. bilineatus*.
 - af. antennal fossa.
 - cf. clypeal foveæ.
 - cl. clypeus.
 - e. eyes.
 - m. mandibles.
 - oc. ocelli.
 - v. vertex.

FIG.

5. Apex of abdomen of *O. bilineatus* (male).
- 4-7. abdominal plates.
- ce. cerci.
- cla. claspers.
- p. penis.

FIG.

6. Cocoon of *Enicospilus purgatus*.
 - op. opening.
 - l. lid.

FIG.

7. Cleaning apparatus.
 - ti. tibia.
 - tic. tibial comb.
 - ta. first tarsal segment.
 - tac. tarsal comb.

PLATE II.

FIG.

8. Wings of *O. bilineatus*. Veins and cells named according to Cresson.

Veins :

a. anal.

ap. appendix.

b. basal.

c. costal.

cu. cubital.

d. discoidal.

dc. discocubital.

fh. frenal hooks.

m. median.

np. nervus parallelus (of Szepliget).

pm. posterior margin.

r. radial or marginal.

rl. basal half of radial or marginal.

r2. apical half of radial or marginal.

re 1. first recurrent.

re 2. second recurrent.

FIG.

s. stigma.

sc. subcostal.

sd. subdiscoidal.

sm. submedian.

tc. transverse cubital.

tm 1. transverse median or nervellus.

tm 2. transverse median or nervellus.

Cells :

1. median or costal.

2. submedian.

3. anal.

4. discoidal.

5. second discoidal.

6. third discoidal.

7. radial or marginal.

8. submarginal or cubital.

9. second apical.

10. first apical.

11. first discoidal.

12. second discoidal.

FIG.

9. Anterior wing of *Thyreodon cyaneus*.

10. Posterior wing of *Eremotylus macrurus*.
n, abnormal vein.

11. Front view of head of *Ophion abnormis magniceps*.

12. Anterior wing of *Enicospilus concolor*.

13. Anterior wing of *Eremotylus angulatus*.

PLATE III.

FIG.

14. Anterior wing of *Enicospilus cubensis*.

15. Anterior wing of *Ophion abnormis* (with abnormal appendix).

16. Anterior wing of *Eremotylus texanus*.

17. Wings of *Ophiopterus ferrugineus*.

18. Metathorax (median segment) of *Ophiopterus ferrugineus*.

19. Anterior wing of *Enicospilus purgatus*.

20. Anterior wing of *Ophion abnormis magniceps*.

21. Cocoon of *Thyreodon morio*.

l, exit opening.

22. Anterior wing of *Enicospilus thoracicus*.

23. Anterior wing of *Enicospilus purgatus arcuatus*.

24. Anterior wing of *Enicospilus flavus*.